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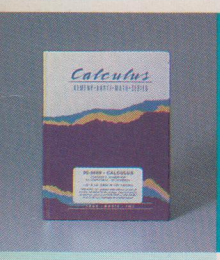

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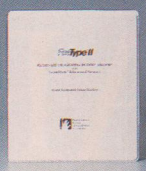

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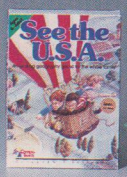

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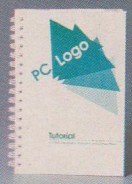

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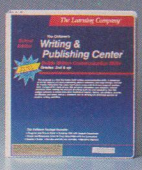

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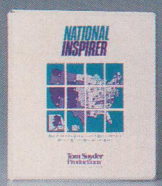

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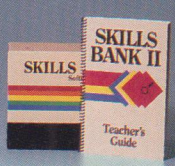

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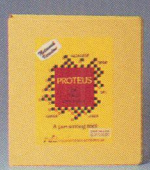

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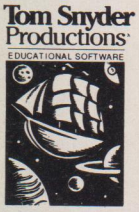

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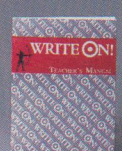

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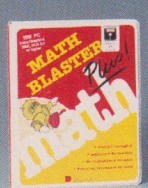

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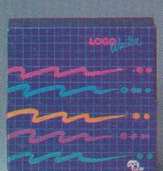

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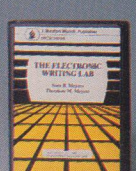

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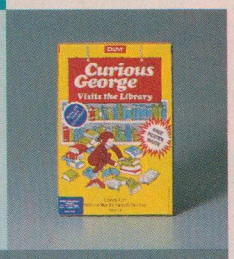

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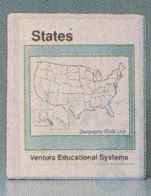

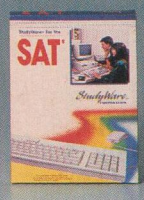

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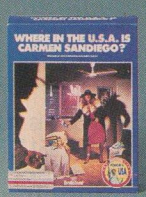

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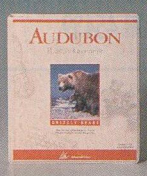

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CIRCLE 29 ON READER INQUIRY CARD

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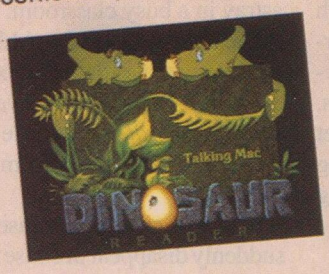

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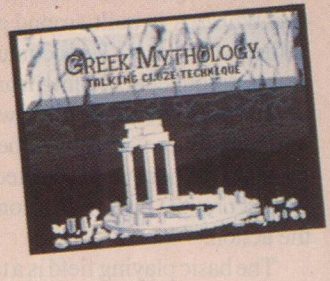


CIRCLE 27 ON READER INQUIRY CARD

SOFTWARE REVIEWS

■ Technology & Learning *evaluators look at a wide selection of the many educational, administrative, and multimedia titles published each year. Those that we find most interesting and useful are reviewed here, with both major strengths and shortcomings highlighted.*

When a software program is available for several different computers, the version evaluated has been identified with an asterisk (*). Bear in mind that versions for differing hardware platforms may differ considerably from one another in terms of speed, performance, and features offered.

***Wordtris* From Spectrum HoloByte**

Wordtris

Hardware: MS-DOS computers (640K)* with Hercules, CGA, or better graphics; supports Ad Lib, Sound Blaster, Tandy 1000, and Roland sound; Macintosh (800K for monochrome, 2Mb plus hard drive for color). **Emphasis:** Language arts. **Grade level:** 3 and up. **Publisher**: Spectrum HoloByte, 2061 Challenger Drive, Alameda, CA 94501; (800) 695-4263. **Package includes:** 3.5- and 5.25-inch disks (MS-DOS), user's manual. **Price:** $44.95, MS-DOS; $49.95, Macintosh.

Think Scrabble with an arcade motif, and you've got the idea of *Wordtris*, a new educational game from Spectrum HoloByte. Like *Tetris*, its predecessor, *Wordtris* is built around a simple yet addictive concept. To accumulate points, you position letters falling from the top of the screen so that they form words, either horizontally or vertically, when they stop falling. The more words created, the higher your score; the higher the score, the faster the action.

The basic playing field is a tank filled to the half-way mark with water. Letter tiles drop from the top of the tank and float on the water. If you land tiles on top of other tiles, the lower ones sink just below the surface. As more are pushed down, the assembled letter tiles begin to resemble a Scrabble maze. Every time a word is formed that the built-in 60,000-word dictionary recognizes, the screen flashes, your score increases, and the tiles comprising that word disappear, leaving room for additional tiles. The game continues until time runs out or the playing field is filled with random letters.

To add to the fun and challenge, there are bonus blocks that double your word score, magic words to spell that clear the screen so you can play longer and score higher, and erasers to eliminate troublesome Qs, Zs, and Xs.

In addition to the single-player mode, there are other game modes as well. In the cooperative game, two players work together to achieve a high score, independently moving letters but sharing the resulting score. In the competitive game, two players compete with each other simultaneously—each controlling one of two falling tiles—to form the most words and earn the most points. And in the tournament game, as many as four players can try sequentially for the highest score on a preset pattern of falling letters. Since each player is working with the same pieces, scores reflect the players' ability to observe and plan ahead. And there's even a game mode for modem users.

Options that make *Wordtris* workable in the classroom include an on/off switch for the sound, time limits to enforce sharing in unsupervised situations, and a dictionary editor for adding or deleting words. If the "no repeat" switch is on, players get points for a given word only once, forcing them to search out new and interesting combinations.

Strengths

- With four difficulty levels to choose among (children's, novice, advanced, and expert), almost every student can enjoy playing.
- The built-in dictionary keeps players honest. If the computer doesn't recognize a word, it doesn't count. There's no arguing about what is—or what is not—a word.
- The cooperative mode gets kids working together to achieve the highest score, a useful alternative to the competitive modes where students may try to prevent each other from scoring big.
- At the children's and novice levels, pushing the pause key stops the game but leaves most of the board clearly exposed. This makes it easier for youngsters to plan, and for adult helpers to point out possible words.
- Wonderful sound effects and exciting music add to the fun of playing the game.

Weaknesses

- Every time users boot the program, the copy-protection routine requires them to consult the manual—which can easily go astray in a busy classroom.
- The time-honored Scrabble tactic of creating longer words from existing shorter ones (like "weary" from "wear") is impossible in *Wordtris*, because all complete words are eliminated from the board as they occur.
- Students can be confused when tiles suddenly disappear because they have created an unusual word by chance—"rive" or "slue," for instance. Teachers might

want to use the delete-word option in the dictionary to address this problem.

Comments

Wordtris isn't just about having fun, it's about strategy, word knowledge, spelling, and physical dexterity. It's a great way to reward your best students and challenge the ones having difficulty. But don't say you weren't warned. *Wordtris*, like *Tetris* before it, is definitely addictive!

■ **Evaluator:** Leslie Eiser, Contributing Writer for *T&L*.

CIRCLE 100 ON READER INQUIRY CARD

The Secret Codes of C.Y.P.H.E.R.: Operation Wildlife

Hardware: MS-DOS computers (640K); 256-color: VGA, MCGA; 16-color: VGA, EGA, Tandy; monochrome: Hercules; supports Ad Lib, Sound Blaster, and Roland sound cards. **Emphasis:** Problem solving, science. **Grade level:** 4 and up. **Publisher**: Tanager Software, 1933 Davis St., Suite 208, San Leandro, CA 94577. **Package includes:** 3.5-inch disk and two 5.25-inch disks, user's guide. **Price:** $49.95. (At press time, a $59.95 school version of the program, adding a teacher's manual with on- and off-computer activities, blackline masters, and backup disks, was set to ship in mid-January.)

The Secret Codes of C.Y.P.H.E.R. is a sleuthing game complete with undercover agents, maps, clues, high-tech gadgets, and coded messages. But instead of revolving around geography and history, the educational content of the program focuses on mammals—87 of them, detailed through a "FunCyclopedia" database of more than 1,400 mammal facts.

To play the game, each student assumes the role of an undercover agent for C.Y.P.H.E.R., a top-secret agency posing as an animal welfare organization called Operation Wildlife. As a secret agent, the player is to collect encoded messages or "cyphergrams" from other undercover agents located through Operation Wildlife's park and surrounding neighborhoods, and to decode those messages for C.Y.P.H.E.R.'s clients (who are invariably embroiled in adventurous mysteries). Throughout this process, players must try to stay ahead of counter-agents from L.U.R.K. (Loathsome Underhanded Rotten Krooks), who try to steal cyphergrams.

The Secret Codes of C.Y.P.H.E.R.: Operation Wildlife From Tanager Software

To collect cyphergrams, the players follow a trail of clues that leads to other undercover agents. These agents hand over cyphergram fragments and, in addition, clues to the identity of a mammal. The player must identify this mammal to find the final cyphergram fragment. For help in doing this, the player can consult the FunCyclopedia mammal database accessed through his high-tech "microscan" watch.

Once a player has collected all the fragments that make up a complete cyphergram, it's time to decode it. To do that, the player must analyze what looks like a random collection of letters (or, at more advanced levels, American Sign Language, Braille, Morse Code, or Semaphore symbols). In fact, the letters are not random: An "A" may really be an "S," and a "B" could represent an "E," so that "abb" would decode as "see." The challenge is to decipher the puzzle within a time limit. A decoder tool helps to test different letter translations for encoded characters. If a player thinks "T" is actually "B," for example, she can see how the cyphergram looks with all Ts replaced by Bs. The decoder can also be used to supply the correct translation of an encoded letter, but this option costs the player one minute of decoding time. Successful decoding completes an assignment, and brings on more difficult challenges.

For added fun, the program also features an "E-mail" option that allows youngsters to leave encoded messages for friends who log on later. These messages become the cyphergrams that secret agents then decode.

Strengths

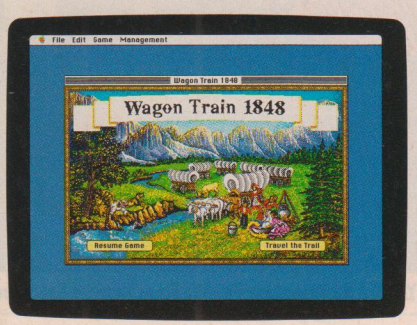
- The well-designed animated graphics, upbeat jazz musical score (if you're equipped with a sound card), and many audiovisual rewards are all very appealing to youngsters.
- The activities—finding contacts, searching the FunCyclopedia to match mammal facts with collected clues, and decoding messages—are quite varied. This, plus the four levels of difficulty and large number of client assignments available, keeps students actively engaged in the program.
- An online training mode is available to introduce new recruits to game rules.
- *Secret Codes* has room for 40 C.Y.P.H.E.R. agent "dossiers," a boon in classroom settings.

Weaknesses

- New players may need several explanations at game startup to handle the number of details and variables.
- Players use up microscan watch energy when they consult the FunCyclopedia, which penalizes them for doing research. And because there is no way to pause during the message-decoding phase of the game, they are also penalized for taking time to think.

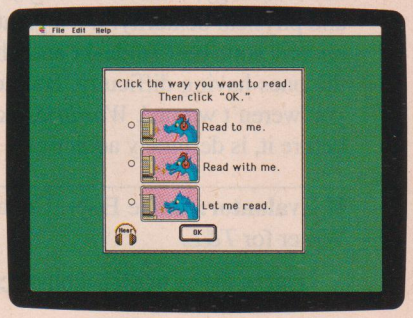
(continued on page 10)

Conventional wisdom says quantity. But Macintosh ha

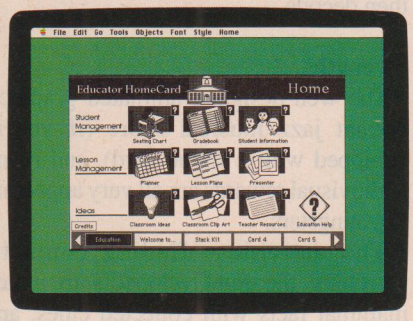


Wagon Train 1848 *from MECC encourages cooperative learning and decision making on a simulated journey across the Old West.*

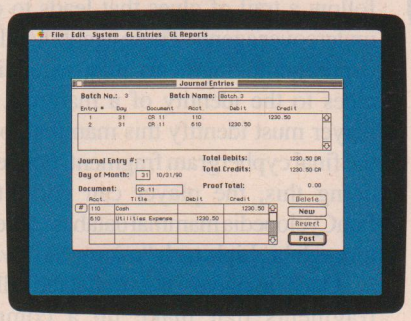
English Express *from Davidson and Associates uses multimedia technology to teach English to limited-English proficient students.*



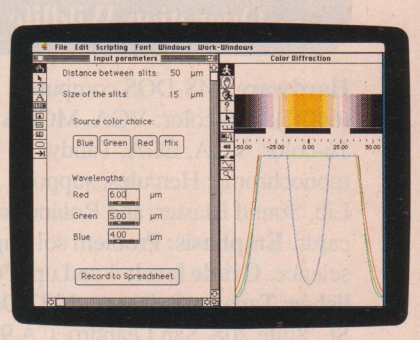
The Primary Integrated Language Arts Program *from Jostens Learning helps teach reading through listening, speaking, and writing.*



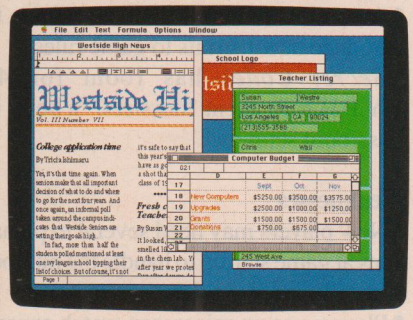
Educator HomeCard™ *from Intellimation uses HyperCard® 2.0 to help educators plan and organize classroom information.*



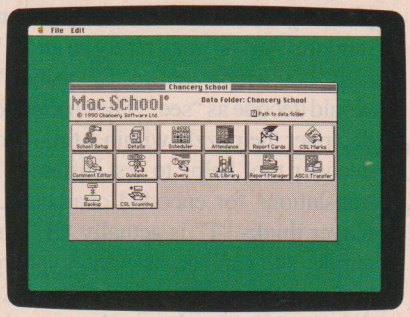
Students get hands-on business experience with Automated Accounting for the Microcomputer *from South-Western Publishing Company.*



Physics Explorer *from WINGS for learning is a new series of experiment-based courseware packages for the physical science curricula.*



SmartWorks *from Leonard Development Group combines 8 programs in 1 and lets students use existing AppleWorks® files, too.*



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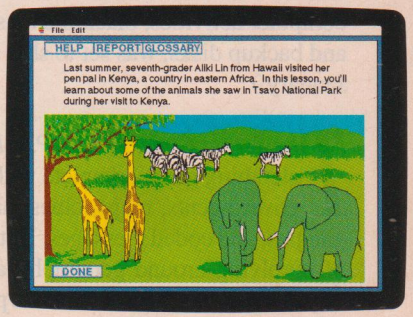
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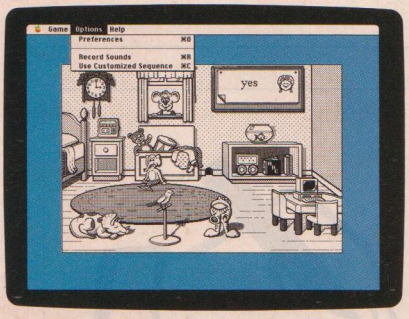

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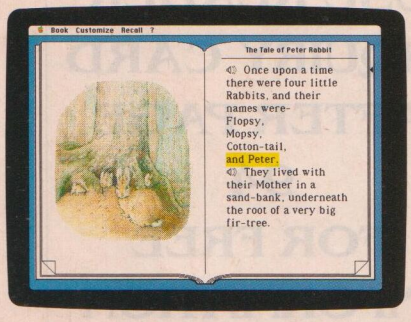
Book Customize Recall ?
The Tale of Peter Rabbit
Once upon a time there were four little Rabbits, and their names were-
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Mopsy,
Cotton-tail,
and Peter.
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(continued from page 7)

- The program's copy protection scheme requires that each student consult the "code wheel" (included in the package) for a code that will make the software run. This requirement may use up time that would be better spent playing the game in a classroom setting.
- The premise of *Secret Codes*—that you must identify a mammal in order to find a secret contact—may seem a bit forced to some users, although the game's secret agent puzzles and mammal research challenges are fun in their own right.
- The printed documentation could be more thorough and better organized.

Comments

Secret Codes of C.Y.P.H.E.R. is a fast-paced, enjoyable activity offering considerable educational potential packaged with lots of game alternatives.

■ **Evaluator:** Carol S. Holzberg, computer journalist and computer resource specialist at Shutesbury Elementary School, Shutesbury, Massachusetts.

CIRCLE 101 ON READER INQUIRY CARD

The Treehouse

Hardware: MS-DOS computers (640K); hard drive; EGA graphics or better; mouse and joystick optional; supports PS/1 Audio/Games Option Card, Ad Lib, Disney Sound Source, Sound Blaster, and Tandy sound. (Macintosh and Apple II versions in development.) **Grade level:** K-4. **Emphasis:** Interdisciplinary (science, music, language arts, math). **Publisher:** Brøderbund Software, 500 Redwood Blvd., Novato, CA 94948; (800) 521-6263. **School edition includes:** Either 5.25-inch or 3.5-inch disks; teacher's guide; user's manual; kid's guide; audiocassette with *Treehouse* theme music. **Price:** $69.95.

From the rap music on the cassette that ships with the program to the attractive graphics and delightful animation, *The Treehouse* is an eye-catching and kid-pleasing offering. This sequel to *The Playroom*, written for somewhat older students, takes place in a treehouse belonging to a pair of possums. Kids select one of the possums and use the huge on-screen arrow to help their new playmate explore the objects found scattered on the floor and walls. A click on the bag of nuts, for example, spills one onto the floor for the squirrels, while each click on the large cloud in the sky makes it change shape. It's even possible to drop things out of the treehouse and then go outside and find them lying around on the ground.

But, like *The Playroom*, this program is far more than click-and-explore: Four of the objects in the treehouse lead to educa-

"What Windows 3.0 Should Have Been."

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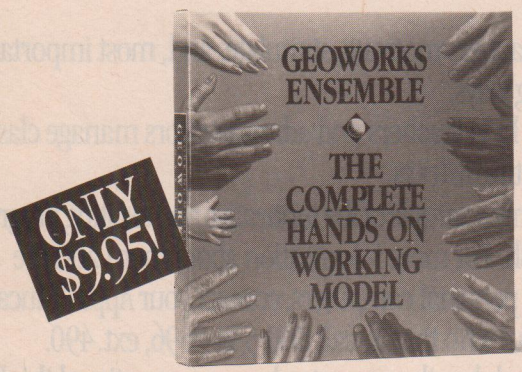

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CIRCLE 24 ON READER INQUIRY CARD

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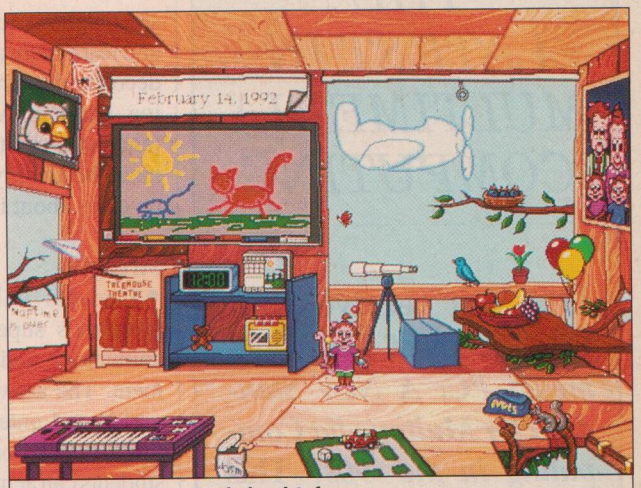
tional games. The toy car transports students to the Road Rally racetrack to practice math. There they can play either a money game or a chips game, against a friend or against a robot controlled by the computer. To win at the money game, players must consistently choose correctly between trays of coins (those with the most coins may not contain the highest value). In the chip game, players practice regrouping skills as they are called upon to exchange one colored chip for ten of another color and vice versa.

Selecting the keyboard that stands in a corner of the treehouse sends the possum into a musical netherworld that's complex enough to be a stand-alone program. Students can compose music at the computer keyboard; listen to one of 20 pre-recorded songs played by a wide choice of instruments; or explore the orchestra, listening to digitized sounds of well-known instruments (as well as homemade alternatives and assorted animal noises). As if this weren't enough, there is also an entertaining maze game that challenges students to recognize musical patterns and identify a mystery song.

In the Treehouse Theater kids construct one-sentence "plays" by choosing from picture menus related to the four "W's" (WHO does WHAT, WHEN and WHERE). The computer then animates the sentence and, if it is equipped with the right sound hardware, even reads aloud each part of the sentence as the action is performed. Other options allow students to move the phrases around and add props to the scenes.



***The Treehouse* From Broderbund Software**

Activities in the Backyard Zoo are built around a huge database that includese12 groups or classes of animals with several representatives of each group, and eight different traits (e.g., body temperature, diet, number of legs) per animal. By clicking on icons representing the different categories,

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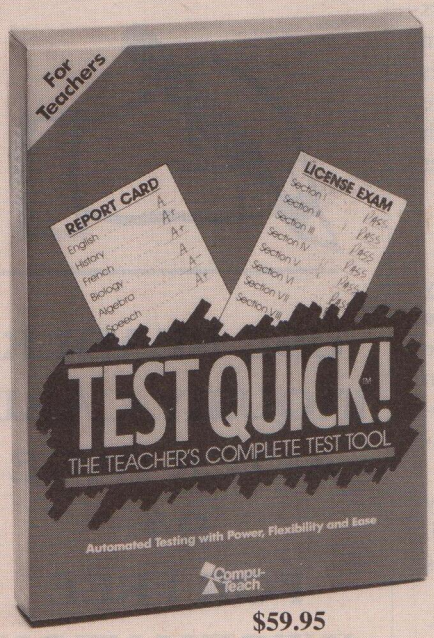

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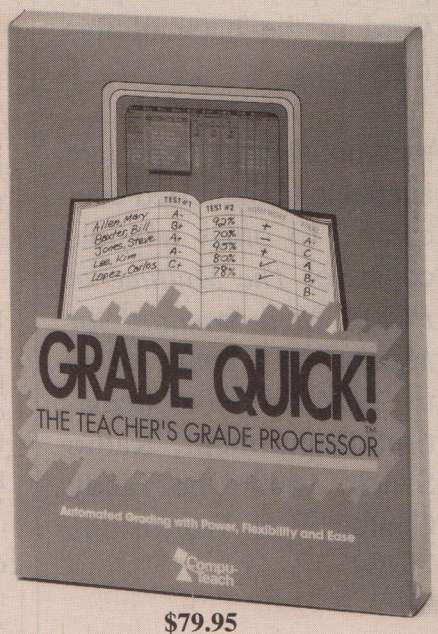

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CIRCLE 15 ON READER INQUIRY CARD

students can zoom in on a particular animal and learn more about it or use its picture to decorate the screen. There's also a guessing game in which students compete (against each other or the robot) to determine the identity of a hidden animal based on clues about its characteristics.

Strengths

- Students will be delighted by the program's superior graphics, humorous animations, and rich exploratory environment. The activities in the treehouse are varied and entertaining (from a gossipy owl to a chalkboard with colored chalk that students can actually use to draw pictures), and the possum narrators add to the fantasy by piping up periodically to ask for food, report that they are tired, or perform tricks. Even the prizes students win for playing games can be used interactively on return to the treehouse.
- The musical section of the program is particularly well done. The quality of the sound (provided your computer has one of the recommended sound boards) and the variety of activities are both impressive.
- Another particularly strong section is the animal database. It is extensive and well-researched, and encourages categorization and attribute discrimination on the part of students.
- The use of competition modes in the various games will easily keep two players occupied for long periods of time. It's even possible for students of very different ages or ability levels to compete using the program's "even steven" option, which allows one student to play with a harder goal or fewer hints than the other.

Weaknesses

- The copy protection routine used by Brøderbund requires students to have the manual handy once every seven times the program is used in order to answer an opening question. This can present a problem in the classroom if manuals are misplaced or lost.
- Users who assume that a mouse is really "optional" are likely to be disappointed. Operating the program with a mouse is much easier.
- Without one of the supported sound options, sections of the program are much less interesting. In fact, to take full advantage of *The Treehouse*, you'll want one of the options that supports both music and digitized sound (Tandy's built-in sound, a PS/1 option card, or the Sound Blaster card).
- The wide age range targeted means that not all the games are equally appropriate to all players. Children with reading problems may find the "Guess My Animal" game too challenging to play, while most of the other games require no reading skill at all. Sophisticated teacher options would be welcome so that students wouldn't have to make level-appropriate choices, a difficult task for many kids.

Comments

The Treehouse, like other exploratory programs before it, is open-ended and entertaining. It also offers a significant amount of educational content, cleverly disguised as play. Despite the rather extensive hardware requirements, the rich, interdisciplinary nature of this program will make it a sure-fire hit with primary-grade teachers everywhere.

■ **Evaluator:** Leslie Eiser, Contributing Writer for *T&L*.

CIRCLE 102 ON READER INQUIRY CARD

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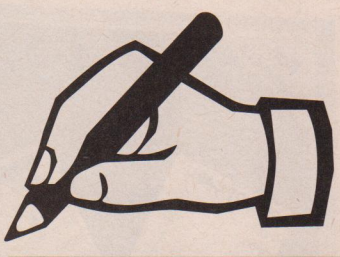

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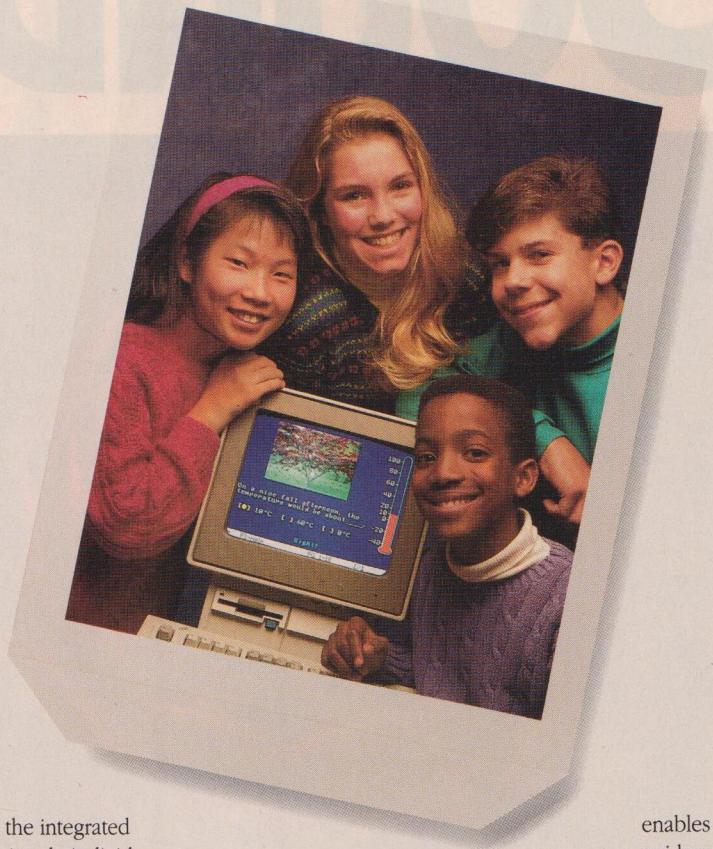

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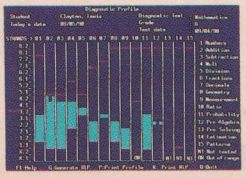

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CIRCLE 25 ON READER INQUIRY CARD

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SOUND

The Next Frontier

Once you've experienced the high-quality speech, multi-voice music, and realistic sound effects coming from the newest sound-enhanced software, you'll never want to return to the beeps and boings of yesterday's computers.

By Mary Cron

One of my favorite scenes in the *Star Trek* movie series comes in *Star Trek IV* when the Enterprise crew travels back in time, landing in San Francisco in the mid-80s to beam up some humpback whales. Scotty and McCoy visit a factory and are offered the use of the manager's Macintosh. Scotty walks over to it, picks up the mouse and says, "Hello, Computer." Naturally, the only response he gets is the puzzled look on the faces of the 20th-century primitives in the room. When the manager diplomatically suggests trying the keyboard, Scotty stares in amazement and then comments, "Oh, a keyboard, how quaint."

Computers that speak and listen have always seemed more at home in science fiction than in the classroom. The built-in speakers on many of the computers in the 1980s were capable of little more than beeps and boings, and the speed and storage capacity necessary for a computer to generate realistic-sounding speech and sound effects are still not all that common in the marketplace.

Nonetheless, development of both speech synthesis and voice recognition began long before the stand-alone microcomputer ever had the power to be a partner in the venture. The people who invested time and money in speech technology in those years were banking on the assumption that the microcomputer would soon become cheaper, faster, and more powerful, and that hardware developers would eventually build into their machines the hardware necessary for high-quality sound output.

The Future Is Here

Every October for the last nine years, I have strolled down the aisles of the exhibit hall at the California Computer Using Educators (CUE) conference. This year, more than any other, I was amazed by the advances in sound technology and the wealth and variety of sound-enhanced applications. I tapped my feet to stereo riffs accompanying educational games, and listened to Beethoven and Stravinsky playing off a compact disc attached to a computer. I heard the clear voices of announcers and cartoon characters giving me instructions and verifying my answers. I typed a quick story on a keyboard and listened to my words read aloud in a less robotic voice than in years past. I spoke into a computer microphone and heard my own voice coming back to me from the machine. I even watched the computer analyze and act upon the words I had spoken.

It's clear that the advances accomplished by sound engineers and speech technologists in the past few years are finally meeting up with machines capable of supporting them. But nothing is easy. One educator at the conference shook his head at the multimedia dazzle and cacophony surrounding him and said, "I need to get out of here and take a walk. I'm absolutely overwhelmed by all this." I felt overwhelmed myself. The rate of change, the complexity of the technology can sometimes appear too convoluted to be practical.

In the pages that follow, we hope to paint a clearer picture of this modern-day "tower of Babel" as we show you some of the ways that you and your students can benefit from the latest breakthroughs in sound technology.

(continued on page 18)

A Sound Technology Primer

The technology involved in making a computer speak, listen, or play music is incredibly challenging to engineers and programmers and very confusing to the user who is confronted with small-print requirements on software packages and an array of add-on boards. Additional questions arise as we actually try out different applications. Why does the speech from this program sound so robotic while the voice used in that other program sounds like a high-quality recording? Why does the sound card in that computer allow me to hear beautiful music but no speech at all? If this software package allows me to record and hear my own voice played back, why can't it analyze my input and tell me how I'm doing?

Understanding the approach being used in a particular application and making sure you have the right equipment to support it are critical to integrating sound-enhanced software successfully in the classroom. What follows is an overview of the choices faced by software developers in deciding what sort of sound input or output to build into their software. (For more information on the hardware you'll need in order to use the different types of sound-enhanced software, see the box on page 35.)

Digitized Sound

Digitized sound, recorded and integrated into a program by its developer, offers the highest-quality speech and sound effects available. To digitize sound, the developer attaches a microphone or external sound source such as a stereo system to the computer. The sound frequency generated by the external source or by someone speaking into the microphone is converted from an analog signal (human ear frequencies) to digital signals (0's and 1's) that the computer can understand. This information can then be saved to disk.

You hear the digitized output (which sounds remarkably like a tape recording) during program operation when the sound is converted back into an analog signal and played through a speaker or headphone. This conversion process requires a digital-to-analog converter (a DAC), which is built into some computers and available through add-on boards for others.

The drawback to digitized sound is that it takes up a tremendous amount of memory. One second, recorded at relatively low fidelity, requires more than 4,000 bytes (4K) of memory—which means that three minutes of digitized sound can entirely fill a low-density 3.5-inch floppy disk. "Compression" techniques are often used to shrink the amount of digital information that needs to be stored to produce each second of sound, but these techniques generally result in lower-quality output.

With improved compression schemes; increased computer memory; and the greater storage capacity provided by hard disks, high-density floppies, and CD-ROMs, the use of digitized sound is on the rise. Applications incorporating this sort of sound output hold tremendous potential for non-readers, students of foreign languages, and any other audience for whom realistic speech and sound effects are important.

Text-to-Speech Synthesis

This approach to speech production is commonly used when a huge amount of speech is required or when an application depends on being able to speak back whatever the user enters via the keyboard. Text-to-speech systems generally use a set of rules to convert written text (ASCII characters) into "phoneme codes" standing for the sounds to be produced by the computer during playback.

Essentially, the computer is taught to "sound out" each new word it encounters. Exception tables are used to handle the many irregularities of the English language, and additional processing helps refine the pronunciation, inflection, and other elements that go into natural-sounding speech. Once a publisher has incorporated text-to-speech rules ("algorithms") into its software, a DAC is needed during playback to handle the conversion from the digital phoneme codes to analog sound.

The more complex and comprehensive the text-to-speech algorithms, the better the speech quality but the larger the storage space requirements. Even the most memory-intensive text-to-speech approach, however, requires far less storage capacity than digitized speech. In fact, once the basic algorithms are in place, they can be used to sound out an unlimited number of words without requiring additional storage or processing power.

The down side to text-to-speech synthesis is that, in spite of recent improvements, it still sounds quite robotic. While children exposed to text-to-speech through talking word processors are rarely surprised or dismayed by the robotic voice (that's the way they expect a machine to sound), more realistic speech is critical to many applications. And as digitized voice becomes more commonplace, our expectations for what a computer should really sound like are becoming higher.

Many publishers who would welcome the flexibility text-to-speech could add to their applications appear to be waiting for the quality to become higher. And there are signs that this is happening. First Byte, the company that has licensed its *Smoothtalker* text-to-speech technology to many educational software developers over the years, recently released a "new, improved" version. Moreover, other companies are hard at work on text-to-speech solutions.

Emerson & Stern Associates' new *Sound Bytes* technology (soon to be incorporated into Emerson's own products and licensed to other publishers) offers higher-quality, more natural-sounding speech synthesis by taking advantage of a huge dictionary of customized words and using context clues to decide how words should be pronounced. (For example, the program will analyze a sentence to determine whether "desert" is being used as a noun or a verb and adjust the pronunciation accordingly.)

Street Electronics, the developer of the Echo sound cards, has also promised a new, significantly improved text-to-speech version of its card to be completed before the end of 1992. And rumor has it that Apple Computer is working on a high-quality text-to-speech option to replace its

old *MacinTalk* algorithms—sold with early Macintoshes but allowed to fall by the wayside when improvements in sound quality failed to keep up with consumer demand. With help from these and other companies, publishers may not have long to wait for high-quality, natural-sounding text-to-speech synthesis.

Encoded (LPC) Speech

Linear Predictive Coding (LPC) is essentially a highly compressed form of digitized speech. As with digitized speech, the human voice is recorded and digitized, but then special hardware is used to compress the data. The resulting voice sounds better than synthesized speech but not as realistic as standard digitized sound. A developer might choose LPC encoding over straight digitization because it is less memory-intensive. The disadvantage of the LPC approach is that it requires a special chip (available on boards such as those sold by Street Electronics) to convert the encoded speech back into an analog signal that approximates the original sound.

In the early days of talking software for education, Street's Echo boards and IBM's Speech Adapter, both with LPC capabilities, were widely supported by educational software developers because the LPC technology made it possible to hear understandable speech played back from an Apple II or entry-level PC with only 64 or 128K of RAM. Today, with computer memory increasing and multipurpose DACs built into (or bundled with) more and more computers, this approach has lost ground.

Music Synthesis

While digitized music (recorded using the same methods as other digitized sound) requires a DAC for playback, the key component in music synthesis is generally a customized music synthesizer chip that resides on a special board placed inside the computer. Two of the best-known manufacturers of such chips are Yamaha (whose technology, known as "FM synthesis," is available on boards from AdLib, Brown-Waugh, and others) and Roland, with its own line of music synthesis boards.

Like speech synthesis, music synthesis usually begins not with an actual recording but with a set of rules and formulas for translating a file (in this case a music file) into codes instructing the computer which sounds to produce. And like speech synthesis, the process is very memory-efficient. Synthesis quality varies, but given the right hardware it's possible to hear high-quality, multi-voice, stereo music synthesized through your computer.

Sampled Synthesis

The term "sampled synthesis" refers to an approach to music production that combines digitization and synthesis. The process begins with digital recordings of individual sounds. For example, a violin, piano, and clarinet might each be recorded playing particular notes. By altering the frequency of playback, the synthesis program generates additional notes which can then be pieced together with the help of special algorithms to create complete tunes.

Sampled synthesis does not necessarily require dedicated music synthesizer chips. It is possible to play back music generated in this manner through a more multi-purpose DAC as long as that DAC supports stereo and multiple voices. (For example, sampled music synthesis is common in software for the Commodore Amiga, which has a stereo DAC capable of four-voice sound.) However, for professional music production, multiple DACs are generally used.

Sound Input

Annotating a student's work with your voice, adding spoken instructions in Vietnamese for students who need them, or allowing your students to narrate their computerized stories—these are all applications of sound input. Using hardware built into the latest Macintosh computers—or with the help of add-on hardware for other machines—it is now possible for the typical end-user to create rather than simply *listen to* digitized sound.

Sound input requires the presence of an analog-to-digital converter (ADC) as well as a digital-to-analog converter (DAC). When sound input is incorporated into an application, the program's developers provide you with a simplified version of the sorts of tools they themselves use for digital recording. Often you can control the sampling rate (frequency at which your voice or other sound is recorded), choose from several different compression rates, and edit out portions of your recording. Because digitized sound is so memory-intensive, the publisher usually helps you to manage the amount you record—limiting the number of places in the program that will accept sound input, using "timeline" bars to show you how long each recording can be, and so on.

Voice Recognition

Speech and technology experts have been at work on this logical extension of sound input for a long time. It's a challenging task and one that is just now becoming a reality. Voice recognition technology strives to give the computer the ability to understand user-spoken words and act on them in some way. With voice recognition, speech-to-text, not just text-to-speech, is possible—bringing the computer age to dictation.

To date, voice recognition designers have focused on three different approaches. One approach attempts to teach the computer to recognize a set of words when spoken by a diverse population of users. Since the program must anticipate a wide range of accents and pronunciations, this approach is quite memory-intensive and generally requires that the program developers seriously limit the number of words to be recognized.

In the second approach, which assumes a single user for each version of the program, the user literally "trains" the system to understand his or her voice. This method works well as long as the user's speech patterns are consistent. The final approach enables the user to train the computer as he or she works. Basically, the program is set up to "learn" a speaker's speech patterns, guessing what the speaker means and then making corrections as feedback is received. This approach is the most experimental and least reliable but holds the most promise for full speech-to-text conversion in the future.

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The Value of Music and Sound Effects

One does not have to tell a music teacher about the power of MIDI synthesis to teach instrumental music or the value of some of the newest CD-based music appreciation programs. But teachers of other subjects may find themselves benefiting from computerized music as well. Take the experimental music instruction system designed by Jacob Schwartz of NYU, for example. The program, which is being tested in a New York City intermediate school, helps students without any musical training compose music on a variety of computerized instruments, and then leads them through the process of comparing the patterns, rhythm, and harmony of their compositions with similar mathematical and scientific structures.

And then there are the less tangible—but ever so real—benefits of high-quality music reproduction and sound effects. If you've ever been tempted to dismiss the significance of the growing support for sound cards by MS-DOS developers, think for a moment about graphics. Most of us take for granted the idea that attractive, high-resolution color graphics and animated effects add realism and appeal to educational software. They may not be necessary to communicate specific content, but they certainly do capture and hold student attention.

And so does high-quality sound. Just watch a group of students as they jive to the background music from a program such as MECC's *Super Munchers* played through the right hardware. Once they've experienced multi-voice music and realistic sound effects, it's as hard to return to beeps and boings as it is to return to an ancient black-and-white television.

A New Generation of Speech-Based Products

You've probably seen this scene from Apple's Knowledge Navigator videotape: A man is sitting on a park bench reading text from the screen of a laptop computer. Arriving at an unknown word, he points to it on the screen and asks, "What's this?" In a clear, friendly voice the computer pronounces the word for him and he goes on reading. When he finishes, the voice asks if he would like to read something else. He picks up his newspaper, turns to the sports page and lays an article across the computer screen which scans it and, abracadabra, he's reading his chosen material, again with the aid of the talking computer.

It's a powerful image—the idea of being able to decode any word at will, privately and repeatedly, without having to ask another person for help. While the above scenario still has a futuristic feel to it, there are a number of products in existence today that are bringing us remarkably close to the reader on the park bench.

Beginning With Books

It's not quite like snuggling up with a beautiful picture book on your lap and reading stories with your favorite little friend, but the emergence of illustrated, voice-enhanced, electronic storybooks signals new independence for beginning readers. Discis, Brøderbund, Orange Cherry, and Texas Caviar are just a few of the publishers using CD-ROM to present young readers with an online reading playground that they can control.

These programs are based on the premise that learning is more involving and effective when different senses are involved. The electronic storybooks incorporate beautiful visuals along with text, speech, and music. For the most part, speech is used to read the basic story at a pace controlled by the child and to decode any words the child requests help with. Sometimes the words are also defined, rhymed, spoken in another language, or even sung.

As children turn the electronic pages, they are delighted with the sights and sounds of an active reading environment. In some cases they are free to explore aspects of the story not available to readers of the printed book. For example, Brøderbund's *Living Books* series has the look and sound of an animated cartoon and allows children to call up a variety of animations and sound effects with the click of a mouse.

At least two publishers have built upon the concept of the electronic storybook, creating full-fledged reading programs based on literature delivered on CD-ROM. IBM's *Stories and More* (reviewed in January) packs 36 stories onto a single CD-ROM, 16 of them with pre- and post-reading activities. To introduce characters and concepts, there are picture puzzles to piece together, short "storyboards" to build using a choice of graphics, and much more.

(continued on page 35)

NEW KEYBOARD TEACHING AID FROM IBM

Remove this giant-size teaching aid—*Keys to Learning Adventures*—and display it in your classroom or computer lab. Its exciting graphics will attract your students and give them handy reference information about both the Enhanced Keyboard and the Space Saving Keyboard.

Gentle pressure will dislodge this teaching aid from the quick-release glue that affixes it to the magazine.

If your copy of *Keys to Learning Adventures* has already been removed, or if you would like to receive an additional FREE copy, circle 99 on the postage paid Reader Inquiry Card at the back of this magazine.

Additional FREE copies are available to interested educators while supplies last. To order multiple copies of *Keys to Learning Adventures*, please send your request in writing to George Hergen, Program Manager, IBM Educational Systems, 4111 Northside Parkway, Atlanta, GA 30327. Be sure to specify that you are requesting *Keys to Learning Adventures*.

Thank you for your interest.

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Post-reading activities include sequencing and recall exercises with graphics and speech as aids, point-and-click exercises to help kids make connections between the stories and their own lives, and some open-ended questions that early writers can respond to at the keyboard and then listen as their words are read back to them using text-to-speech synthesis.

Dragon Tales from Jostens Learning Corporation is another comprehensive literature-based reading curriculum built around a set of talking stories. *Dragon Tales* makes extensive use of both digitized sound and text-to-speech. The core text is presented initially in the form of familiar songs, a wonderful way to involve young learners in new reading material. In other portions of the program digitized voices (of men, women, children, and special characters) are used to narrate stories; decode child-selected words; and read prompts, instructions, and menu choices.

After working through the story in a variety of ways, the children are able to create their own illustrated storybooks. They can draw their own pictures, select

The Hardware Connection,

Or What You Need to Make It Sound Good (Or At All) on Your System

Speech input and output technologies rely heavily on the features of the host computer to produce quality sound. These hardware components, described below, might be built into the computer by its manufacturer or placed there by its owner in the form of an accessory sound board (see the chart on page 38).

Digital-to-Analog Converter (DAC): A DAC is a device that translates digital data (computerized information) to an analog signal at a frequency human beings can hear. The existence of a DAC is important for the playback of digitized speech, music, or sound effects and of text-to-speech.

The Apple IIGS, Macintosh, and Amiga computers all have DACs built into them, as do almost all of Tandy's current MS-DOS computers. With other MS-DOS and Apple II machines, on the other hand, digital playback capabilities are added to the system with the help of special sound cards or external boxes. (Actually, it is possible for developers to "simulate" a DAC through software, which is why you occasionally see signs on software packages saying, "Speaks on your PC without extra hardware." But the results are rarely as good as those achieved with a real DAC and the process requires that other elements—the microprocessor, computer speakers, etc.—be quite powerful.)

DACs vary quite a bit in terms of their capabilities. A 16-bit DAC produces richer, more realistic sound than a 12-bit DAC which in turn is better than an eight-bit DAC. (The tradeoff, however, is that the more bits a DAC uses to store information, the more of your computer's memory it requires.) DACs can be monophonic or stereophonic, which naturally affects sound quality as well.

Analog-to-Digital Converter (ADC): An ADC is necessary for voice recording or any other sound input on the part of the end-user. The ADC translates the analog signals that we can hear into digital signals that the computer can understand. Digital sound data can be saved in memory or stored on a hard disk.

Apple's Macintosh LC, IIsi, and Classic II computers all have a built-in ADC, a microphone, and simple software tools to allow users to input sound. Tandy's computers have offered built-in ADCs for quite some time, although the general public has been less aware of them (in part because Tandy has not bundled microphones with its machines and in part because developers have been hesitant to take advantage of the features without a larger installed based of non-Tandy DOS machines with sound input capabilities).

As with DACs, ADCs vary in terms of the quality of sound that can be recorded (16-bit vs. eight-bit, stereo vs. mono, and so on). In comparing sound input options it's equally important to pay attention to the software that accompanies the ADC, allowing the user to compress and edit the recorded sound.

Digital Signal Processor (DSP): If you read the fine print describing various sound card options, you will notice that some of the more powerful boards designed to handle sound input or output boast a separate DSP. This processor takes care of some of the sound-related computing tasks that might otherwise be left to the computer—for example, compression and decompression of digitized sound or conversion from text to speech. The DSP might result in faster program operation, higher-quality sound, or smaller sound files.

Music Synthesizers: Music synthesis chips, available primarily through add-on cards for your computer, translate digitally stored music files into analog music. (In a sense they act as special-purpose DACs.) The quality of the chip and the synthesis algorithms that accompany it determines the richness of the sound, whether it is in stereo or mono, and the number of distinct notes ("voices") that can be heard at once.

Music synthesis cards also vary in terms of how fully they support MIDI, the industry standard used when allowing external devices such as synthesizer keyboards to communicate with the computer. MIDI input and output ports on a card make it possible for music created on an electronic instrument to be played back through the computer and vice versa.

Speakers: Most computers have some sort of a built-in speaker, although the

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labeled graphic objects from a dictionary, or write their own text. Text-to-speech technology is used to speak the names of all the graphic objects and read back the child-created stories.

Beginning With Writing

While story-writing is a follow-up to reading in *Dragon Tales*, it is the starting point in a number of other speech-based programs for young children. The word processor that talks with the help of text-to-speech is potentially one of the most exciting tools around for young people. First Byte's *KidTalk*, Scholastic's *Talking Text Writer*, Hartley's *Dr. Peet's Talk/Writer*, IBM's *Primary Editor Plus*, and the word processing portion of Great Wave's *Kidstime* program are just a few of the talking word processors that have been on the market since the mid-1980s.

In spite of the widespread appeal—to educators and kids alike—of a word processor that will read back whatever is entered, there have been surprisingly few product updates or new announcements in this arena in the past few years. But it looks as though this might be changing.

Davidson & Associates recently released *KidWorks*, a modern-day version of the talking word processor enhanced with graphics tools to allow young kids to create attractive illustrated stories. The writing component of the program enables students to compose stories of any length in

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The Hardware Connection

(continued from page 35)

quality of such speakers varies quite a bit from model to model. If a program relies on the computer's internal speaker for its sound output, the speaker's power and position (how far it is from the computer's plastic case) are critical to the quality and volume level of the sound. Unfortunately it's hard to tell from looking at a "spec sheet" describing a new computer what its speaker will sound like; you can be sure only by listening for yourself.

Commodore has taken an approach quite unusual in the computer world (although not in the consumer electronics world): The speaker devices for the Amiga line are built into the monitors rather than the computers themselves, resulting in considerably better sound quality. With most other computers, the alternative to relying on internal speakers is to plug headphones or external speakers (ranging from a single, amplified speaker to a complete stereo system) into the machine. Given the limitations of internal speakers and the increasing demand for high-quality output, more and more developers and end-users are taking this approach. In fact, most of the high-quality music cards and even some of the newest multimedia computers no longer offer built-in speakers—automatically routing sound to an external headset or speaker instead.

Amplification: While an amplifier is generally a separate unit in your home stereo system, in the computer world it is likely to be included with a DAC or speaker. Most computers and sound cards include small amplifiers. For more powerful output, however, amplified speakers, available at a reasonable cost from computer retail stores, produce the best results.

Volume Control: Teachers don't have to be told how critical it is to be able to control the volume level of computer-generated sound. Fortunately this sort of control is being built into most of the newest hardware designed for sound output—accessed either through a software "control panel" or a dial that can be reached from outside the computer.

Adequate Storage: High-quality sound requires a lot of computer memory. It is not uncommon these days for educational games enhanced with speech, sound effects, and music to require a hard disk and one or more megabytes of memory. The advent of the compact disc has done a lot to make sound-based applications a realistic option for schools. CD-ROM, with its massive storage capacity, provides a platform for applications with significant quantities of digitized sound.

Many popular CD-ROM drives are capable of functioning as audio CD players as well as computer storage devices. They have built-in DACs of their own that convert the standard CD audio format ("Redbook audio") agreed upon by the consumer electronics world into analog signals. They also have jacks that allow the music to be sent to external speakers or headphones.

Developers of CD-ROM products with a heavy emphasis on sound have two choices: They can record Redbook audio (resulting in very high-quality but memory-intensive sound) or use standard computer-style digitized sound, also known as "waveform audio" (far less memory-intensive, and more than adequate for speech and background music).

It used to be hard for developers to mix and match the two types of sound, since one was played back through the CD-ROM drive and the other through the computer (meaning that the end-user had to know which device to plug the speakers into). However, some new operating environments such as the *Multimedia Windows* software that ships with a number of today's multimedia computers (e.g., the MPC computers from Tandy and others, and the Ultimedia line soon available from IBM) take care of routing both types of sound through the computer so that the user need not be aware of which is which.

Adequate Processing Power: High-quality sound often requires a fair amount of computer processing power. This is particularly true of applications that attempt to play back digitized sound without a DAC (see above) or employ complex text-to-speech or voice recognition algorithms. Many applications that involve sound input or output now specify that they require a minimum processor speed (for example, a 10 or 12 MHz MS-DOS computer).

Kids are learning to read with a little help from their friends.

"This really gets the students motivated about reading on their own. They get all fired up."
—Jeanne Ellis, Graham Elementary School, Shelby, NC

Learning to read is a lot more fun with a classroom full of rousing characters.

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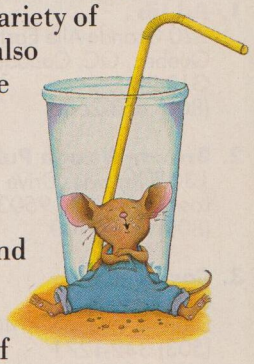
And Stories and More, along with IBM's Teaching and Learning with Computers approach to incorporating computers and software into the classroom, complements a variety of teaching and learning styles. It also includes an integrated Language Arts Guide that gives teachers a range of lesson suggestions and materials.



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INTRO:
The MS-DOS world offers many options for adding sound, though features vary, and solutions are rarely compatible. Just because two cards offer a DAC does not mean the same software will work on both. For a card to be helpful, it needs to offer the right features and be supported by the software you're interested in. Most publishers are working with manufacturers to make sure that software supports several options.

The devices listed here work on a range of MS-DOS computers; each has volume control and jacks to connect devices such as speakers or headphones.

Sound Cards

Company	Board/Unit	DAC for Digital Playback	Text-to-Speech Synthesis*	LPC Speech	Digital Signal Processor (DSP)
1. Ad Lib 220 Grande-Alle East, Suite 850 Quebec, QC, Canada G1R 2J1 (800) 463-2686	Ad Lib Music Card Ad Lib Gold 1000	 X (12 bit)			 X
2. Brown-Waugh Publishing 130-D Knowles Drive Los Gatos, CA 95030 (800) 451-0900	Sound Blaster Sound Blaster Pro	X (8 bit) X (8 bit)	X X		
3. Covox 675 Conger St. Eugene, Oregon 97402 (503) 342-1271	The Speech Thing Sound Master II	X (8 bit) X (8 bit)	X		
4. Digispeech 550 Main St., Suite J Placerville, CA 95667 (916) 621-1787	DS201 Audio Adapter Unit	X (14 bit)			X
5. IBM PO Box 1328-W Boca Raton, FL 33429 (800) 426-2468	M/Audio Capture & Playback Adapter PS/1 Audio Option	X (16 bit) X (8 bit)		can play it back	X
6. Roland Corp. 7200 Dominion Circle Los Angeles, CA 90040 (213) 685-5141	LAPC-1 Sound Card				
7. Street Electronics 6420 Via Real Carpenteria, CA 93013 (805) 684-4593	Echo PCII Echo Aud/IO	X (8 bit) X (8 bit)	X X	X X	 X
8. Walt Disney Computer Software 500 S. Buena Vista Burbank, CA 91521 (800) 688-1520	Sound Source	X (8 bit)			

Comments for Sound Cards

1a. AdLib Music Card: Simple and versatile music card; an industry standard for music-enhanced games.

1b. AdLib Gold 1000: Powerful stereo music card with digitized speech capabilities added; still in development at press time.

2a. Sound Blaster: Same type of music as AdLib though lower quality; first popular card to offer both music and digitized output; supported by most sound-enhanced games.

2b. Sound Blaster Pro: Full-featured stereo music and speech card; conforms to MPC standard and bundled with Tandy's MPC line.

3a. The Speech Thing: Older, special-purpose speech card.

3b. Sound Master II: Not as well-supported as other options but very versatile; compatible with AdLib music.

4a. DS 201 Audio Adapter: Offers high-quality compressed speech; sold at educator's discount under IBM vendor

* Includes not just the ability to play the speech, but also the algorithms for translating from text into speech.

for MS-DOS Computers

Music Synthesis	Stereo Output	MIDI In/ Out	Sound Input	Voice Recognition Software	Type of Unit	Suggested Retail Price
X (11 voice)					internal card; speakers not included	$119.00
X (22 voice)	X	X	X		internal card; speakers not included	$299.00
X (11 voice)			X		internal card; speakers not included	$169.95
X (22 voice)	X		X		internal card; speakers not included	$299.95
					external unit including speaker	$79.95
X (11 voice)		X	X	X	internal card; speakers not included	$229.95
X (3 voice)			X		external unit including speaker	$198.95
X (8 voice)	X	X	X	available separately	internal card; speakers not included	$370.00
X (3 voice)		X	X	available separately for more powerful PS/1 models	internal card or external unit; plays back through PS/1 speaker	$129.00
X (32 voice)	X	X			internal card; speakers not included	$595.00
					internal card + external speaker unit	$99.95
X (20 voice)	X	an option at extra cost	X	available separately	internal card + external speaker unit	$149.95
					external unit including speaker	$39.95

logo; backward compatiblity with IBM Speech Adapter, which it replaced.

5a. M/Audio Capture: IBM's deluxe sound card for multimedia; bundled with IBM's current Ultimedia machine. Available to schools at IBM educational discount.

5b. PS/1 Audio Option: Basic sound card for PS/1 line only; a bundled version available including joystick and three popular consumer titles.

6a. LAPC-1 Sound Card: Professional-quality, multi-feature music card with full MIDI support; supports sampled synthesis.

7a. Echo PCII: Speech card for MS-DOS; part of a popular line that includes Apple II cards; compatible with older Echo PC+ and IBM Speech Adapter.

7b. Echo Aud/IO: Full-featured sound card; still in development at press time; sequel to the Echo DSP used for developing Optimum Resource software.

8a. Sound Source: Low-end sound enchancement option; supported primarily by Disney's own software line.

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two sizes of text. Young writers can hear their stories spoken word-by-word or sentence-by-sentence, as they write or afterwards. If they don't like how a word sounds, they can use an exception dictionary to change the word's pronunciation.

As students write they also have access to a 200-word dictionary of pictures and corresponding words. Any picture symbol or the word it represents can be inserted into the story, rebus-style—and kids can switch back and forth between picture and word at will. It's also possible for users to create their own picture symbols when none is present that represents the word they want. Young children will delight as the computer reads back their picture stories, pronouncing aloud both the written and graphically represented words.

Another interesting application of text-to-speech technology is *Talking Fingers* from California Neuropsychology Services. The program, which runs on an Apple II with a Street Electronics sound board, was created to help young children learn to write whatever they can say. The premise: In order to write, kids simply need to know how to talk, know the code that stands for each sound they wish to make, know how to put code together to represent words, and have access to a tool that helps to translate from code to paper.

Talking Fingers presents a number of characters who "live" in the keyboard. These keyboard characters, each associated with a different finger stroke and speech sound, star in stories, songs, and activities designed to introduce word processing. With their help, students are soon typing words, phrases, and stories of their own invention. Digitized voice is used for sound effects and prompts, and text-to-speech to read back the stories.

How Do I Sound?

One of the most common uses of voice input in instructional software is to help reinforce a student's pronunciation. For example, there are several ESL and foreign language programs on the market that prompt students to repeat words into a microphone attached to the computer and compare their own pronunciation (played back to them by the computer) with the digitized voice of a native speaker. (For more information about such programs, see "Tools for Teaching ESL and Foreign Languages," *T&L*, May/June 1991.)

The natural next step, of course, is software that not only plays back a student's voice but also provides intelligent feedback. One of the first examples, geared towards students of reading rather than foreign languages, has been developed by researchers from the University of Connecticut and Optimum Resource. Using sound input hardware and voice recognition software developed by Street Electronics, they have created an experimental, interactive curriculum to assist reading-

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To Find Out More About Applications Mentioned in This Article:

Articulate Systems
600 West Cummings Park
Suite 4500
Woburn, MA 01801
(800)443-7077

Brøderbund Software
500 Redwood Boulevard
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Novato, CA 94948-6121
(415) 382-4400

California Neuropsychology Services
50 Acacia Avenue
San Rafael, CA 94901
(415) 456-4854

Davidson & Associates
PO Box 2961
Torrance, CA 90509
(800) 556-6141

Discis Knowledge Research
45 Sheppard Avenue, E.
Suite 410
Toronto, Ont. M2N 5W9
(416) 250-6537

Dragon Systems
320 Nevada Street
Newton, MA 02160
(800) 825-5897

Emerson & Stern Associates
10150 Sorrento Valley Rd., Suite 210
San Diego, CA 92121

First Byte
Order through Davidson
& Associates

Great Wave Software
5353 Scotts Valley Drive
Scotts Valley, CA 95066
(408) 438-1990

Hartley Courseware
133 Bridge
Dimondale, MI 48821
(517) 646-6458

IBM
PO Box 1328-W
Boca Raton, FL 33429
(800) 426-2468

Jostens Learning Corp.
6170 Cornerstone Court East
San Diego, CA 92121
(619) 587-0087

The Learning Company
6493 Kaiser Drive
Fremont, CA 94555
(800) 852-2255

Optimum Resource, Inc.
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Norfolk, CT 06058
(800) 327-1473

Orange Cherry Software
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Pound Ridge, NY 10576
(800) 672-6002

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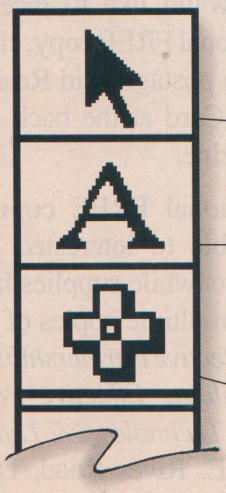

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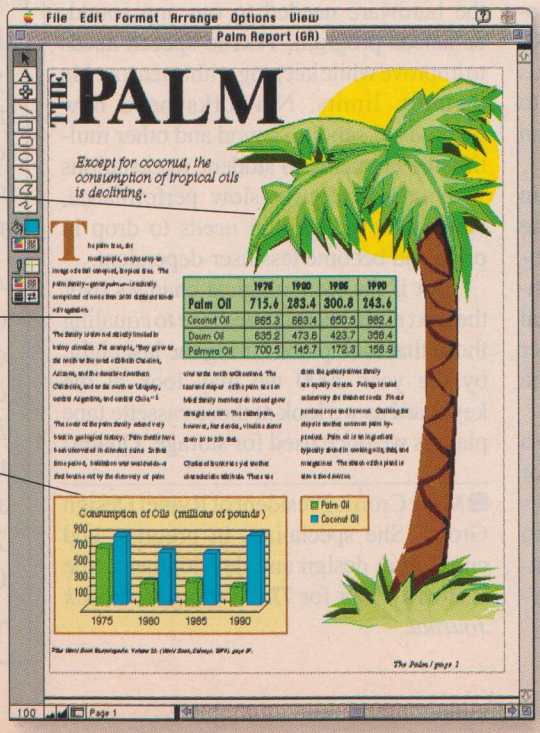

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CIRCLE 23 ON READER INQUIRY CARD

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disabled students of all ages.

Focusing on two- and three-letter "decoding units" such as *ire* and *ush*, students enter into a spoken dialogue with the computer. A decoding unit appears on the screen and the student is prompted to pronounce it. The program then analyzes the student's input and responds accordingly—providing more practice if needed.

The voice recognition approach used by this program compares the student to his or her own speech, eliminating the problem of matching input against a "correct" computer model. To maximize the number of students who can work with the program, a separate disk with personalized voice samples is kept for each user.

Dictating to the Computer

In Scotty's world, computers turn spoken words into text and understand voice commands. How far are we from Scotty's world? Not that far, judging by the newest products from Dragon Systems. Dragon has developed its own sound input hardware and has worked with the creators of other boards to design voice recognition programs that support their boards. One of Dragon's most recent partners is IBM.

VoiceType, the IBM program that grew out of the collaboration, works with IBM's M/Audio Capture and Playback Adapter. It is one of the first products to offer large-vocabulary speech recognition for a commercially available PC platform. With *VoiceType* a user "word processes" a document simply by speaking. The program can handle an entry rate of about 40 words per minute. It recognizes 5,000 words automatically and there's room for users to select 2,000 additional words from an 80,000-word backup dictionary.

It's not necessary for a speaker to train the computer before beginning to use *VoiceType*. Instead, the program automatically adapts its built-in acoustic and language models to each user's individual speech and language patterns. The longer a speaker uses the system, the higher the program's accuracy and performance.

VoiceType is not cheap; it retails for a little over $3,000. (A similar program for Dragon's own board, with four times as many vocabulary words, costs close to $9,000.) But for physically challenged individuals who cannot manipulate a keyboard, it is a godsend.

As time goes on and prices drop, an even broader audience is likely to benefit from such programs. Children with whom the software was tested were enchanted with having their spoken words immediately become text on the screen. In fact, it's hard to imagine a more powerful way of teaching learners of all ages to read.

1992 and Beyond

Listen carefully at the next educational technology conference and you'll hear other applications of sound technology, ranging from traditional to futuristic. Look for spelling programs from The Learning Company and Davidson that use voice to quiz students on word lists. Or ask a Brøderbund or Scholastic rep to demonstrate how they've integrated sound input into their products, making it possible for students to narrate their own illustrated stories, or for teachers to translate selected words into a language an ESL student can understand.

And listen for business-oriented products that point to a time when sound input and output are integrated into everyday computing—products such as First Byte's *Monologue,* which allows any *Windows* application to talk, and Articulate Systems' *Voice Navigator II,* which gives users voice control over existing Mac applications.

There are still challenges to be overcome in the world of sound technology. Standards still need to be agreed upon so that consumers can be confident about buying machines that are equipped with the hardware needed to run any sound-enhanced program. Text-to-speech needs to improve while keeping within reasonable memory limits. Networks need new methods of sending sound and other multimedia elements to student workstations without ridiculously slow performance. And voice recognition needs to drop in price and become less user-dependent.

But if the technological changes over the next eight years come close to equaling those that took place during the last eight, by the year 2000 we may look at the keyboard as we look at those cassette tape players we once used for storage. Quaint!

■ Mary Cron is President of Rymel Design Group. She specializes in program and curriculum design and development. She is Board Chair for *The Writing Notebook Journal.*

How Can Schools and Businesses Both Benefit by Forming Partnerships That Will Help Reform Education?

We hope you enjoy your copy of *Building Effective Partnerships*, which has been bound into this publication. Learn what is happening across the nation as schools band together with businesses and community groups to achieve common goals. Sponsored by Apple Computer, this special supplement explores some outstanding partnerships, explains outcomes, and advises readers on ways to establish their own partnerships.

If your copy of this exciting, 36-page, four-color supplement has already been removed, or if you would like to receive an additional FREE copy, circle 96 on the postage paid Reader Inquiry Card at the back of this magazine.

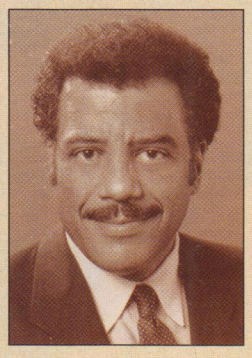
Additional FREE copies are available to interested school districts while supplies last. To order multiple copies of *Building Effective Partnerships*, write to *Building Effective Partnerships, Technology & Learning*, 2451 E. River Road, Dayton, OH 45439.

Thank you for your interest.

Building Effective Partnerships

A Special Supplement to
Technology & Learning
Sponsored by Apple Computer

A Word From Apple Computer...



Fellow educators,

Apple's deepest roots are in education. So it's a pleasure to bring you this information about business/school partnerships.

Over the past 15 years, we at Apple have evolved mutually beneficial partnerships with educators all over the nation. For us, an important outcome has been learning what kinds of tools educators need to support their goals. We're also enjoying the opportunity to discover—with you—the many ways in which technology can inspire changes in education.

In return, we've developed tools that can help you be more effective professionals. We've provided options from which you can make the right decisions for your students. And we've offered special pricing to educators.

During this time, individual schools and districts have also been developing other partnerships with businesses and community groups. Some of these partnerships have established apprenticeships or mentoring programs. Others have funded scholarships for at-risk youth, or provided needed equipment for financially strapped schools. And still others have created professional symposia that revitalize teachers. However, the goal they all share is to improve education.

The information in this supplement explains the concept of business/school partnerships, looks at many of the possibilities, and provides useful references for getting started. You'll find some ideas that are familiar, and others that may be useful jumping-off points for your own work. The supplement is really a way of sharing with you what you're doing collectively. And it's also the first step in a new Apple partnership program that you'll be hearing more about in the coming months.

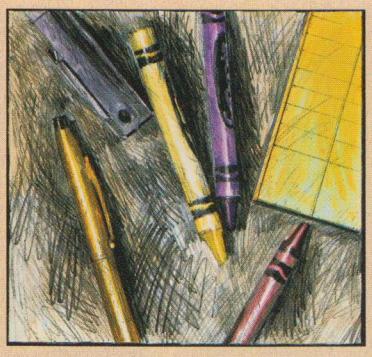
As you read the following pages, consider what kinds of partnerships will meet your own educational goals. Then use your imagination to envision them. And remember that good partnerships are a two-way street: They're most successful and satisfying when, over the long term, all participants are contributors as well as recipients.

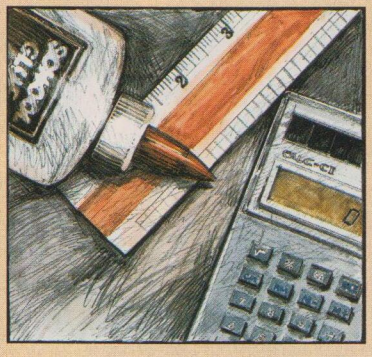
Yours in progress,

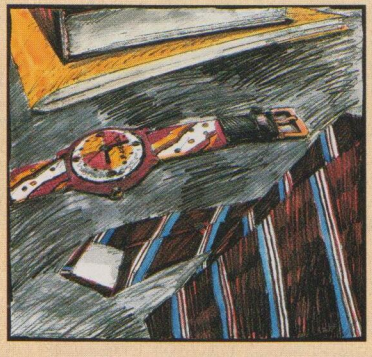
BR Gifford

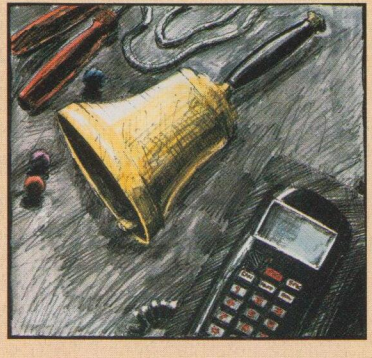
Bernard R. Gifford, Ph.D.
Vice President, Education
Apple Computer, Inc.

In This Special Supplement...









Why Partnerships?

by Daniel E. Kinnaman

Many educators involved in restructuring education are hoping to establish business/school partnerships to help support their reform efforts. Those educators already involved in successful partnerships have learned that such partnerships are built on a single important principle: *Both partners need to benefit.*

What Kinds of Outcomes Result From Effective Partnerships?

by Daniel E. Kinnaman

Supplemental funding for a school or district is the most common outcome of business/school partnerships. But there's more to be gained than money. Effective partnerships can produce scores of beneficial outcomes for all participants.

- Outcomes That Empower Teachers
- Outcomes That Expand Student Learning
- Outcomes That Improve Organization and Management
- Outcomes That Build Coalitions

Where to Look for Partners

by Gail Morse

In drawing up a list of potential partners, most educators start—and end—with a dozen familiar Fortune 500 names. But in fact, there are many other potential partners to consider, partners that come from all sectors of the local and national community.

How to Get More Information

by Ellen R. Bialo and Jay P. Sivin-Kachala

A large array of information resources is available to schools and districts interested in developing partnerships. Here's a list of some of the most helpful resources.

Why Partnerships?

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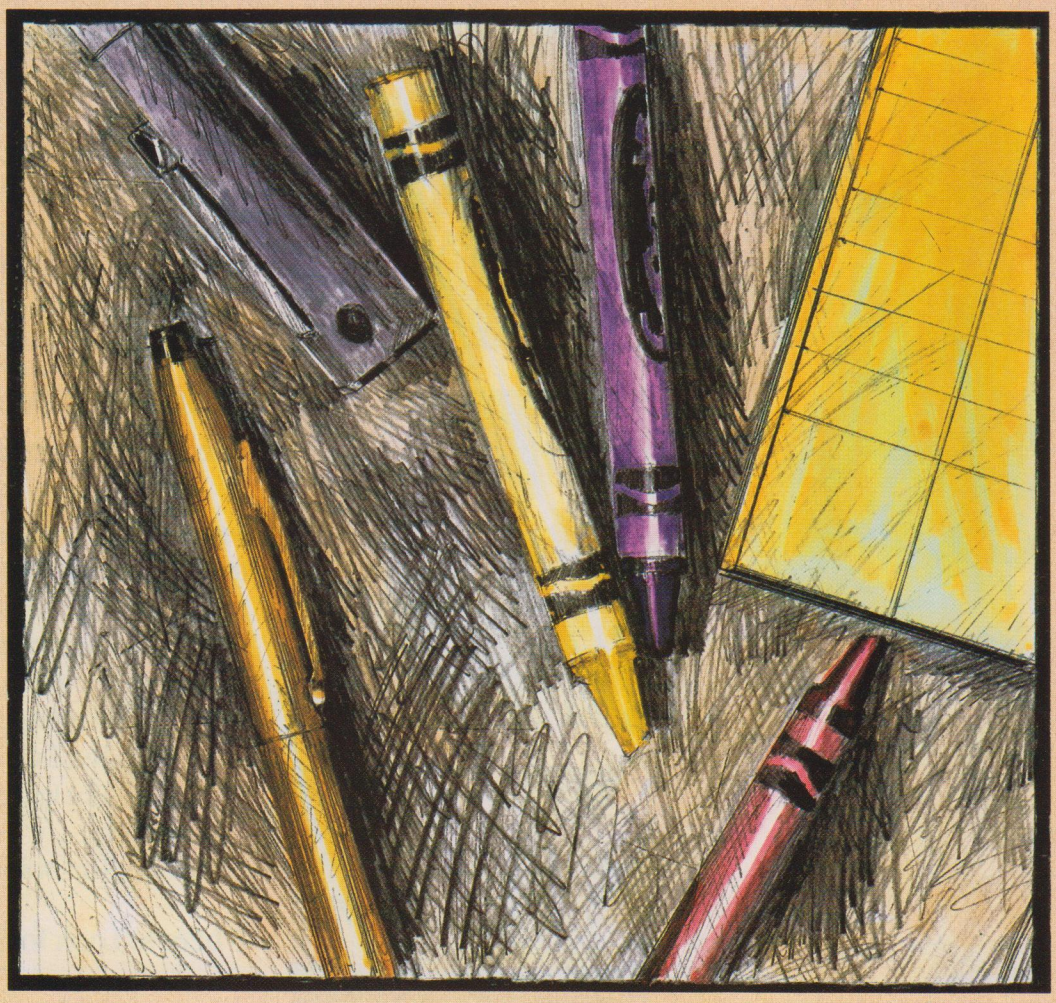
Many educators involved in restructuring education are hoping to establish business/school partnerships to help support their reform efforts. Those educators already involved in successful partnerships have learned that such partnerships are built on a single important principle: *Both partners need to benefit.*



School/business partnerships are enjoying a period of unprecedented popularity and growth. A 1989 study conducted by the National Center for Education Statistics found that only about 24 percent of the nation's schoolchildren attended schools that engaged in partnerships with business. By comparison, a 1991 study conducted by the National Association of Partnerships in Education (NAPE) for the U.S. Department of Education revealed that more than 65 percent of the total student population attended schools in districts with partnerships. While these two studies are not entirely comparable (the 1989 study surveyed individual *schools* while the more recent one surveyed *districts*), they do underscore the increasing interest among schools and businesses in entering into partnerships with one another.

What's more, the White House recently recognized the importance of school/business

alliances as a key ingredient for education improvement through *America 2000: An Education Strategy.* This initiative, which was drafted for the President by Secretary of Education Lamar Alexander and is supported by the nation's 50 governors, has resulted in the establishment of the New American Schools Development Corporation, an organization with the main goal of forging national partnerships between business and education. The New American Schools Development Corporation will channel money from the private sector into the hands of the educational innovators to build the next generation of American schools.

Where is all this momentum coming from? Why are so many partnerships being forged now? The answer lies in part in the educational reform movement that has captured the intense interest of the nation. The need to foster school/business partnerships grows in part from the need to meet the challenges of the 21st century.

The Need to Restructure Education

America's system of education has long been a model for the rest of the world. Its strength is drawn from hundreds of thousands of highly competent and dedicated teachers and administrators who put a tremendous amount of time and energy into their work. And its promise is evident in the precept that schooling must be and will be available to the entire population.

But despite past successes, the public's perception of American education has changed from pride to frustration. Why is this so? For one thing, there is a growing realization throughout the country that learning the same things that students learned 20 years ago isn't enough to prepare today's students for tomorrow's world. The materials and methods used to teach students in an industrial age are clearly out of step with the needs of students in today's technology-driven information age.

Widespread concern has also resulted from the difficulty schools have in meeting the needs of an increasingly diverse student population. Social, moral, and political forces have created challenges that schools have never before had to address. How are schools to respond to the growing number of students whose native language is not English? And how are schools to deal with the social and economic issues that bring millions of kids to school every day unready to learn because they suffer from poverty, drug abuse, or dysfunctional families?

The magnitude of these social issues is so enormous that many Americans worry that our education system *in its current form* may not be capable of responding adequately to the rapidly changing situation. The rules of the game have changed to the extent that the need to restructure is evident.

Obstacles to Overcome

Despite their agreement with the premise that reform must take place, many educators are finding that changes—especially fundamental changes in the structure and function of schools—do not come easily. Powerful constraints to change are so well entrenched in the present system that overcoming them often seems an insurmountable task. Consider, for example, the process of setting school budgets. While the process is rarely identified as an obstacle to reform, it may do more to discourage change than any other single factor. That's because more than 75 percent of most school budgets is allocated to recurring fixed costs such as staff salaries and building maintenance.

This is where successful partnerships with business become so important. With the school budget process and other factors acting to

preserve the traditional school structure, collaboration with the business community can be one of the most effective ways for schools to break through the barriers to change. Partnerships can help schools implement reforms and try out innovative programs that will prepare today's students for the demands of the 21st century.

Partnerships: A Two-Way Street

What makes a successful business/school partnership? That's a difficult question to answer—in part because every alliance has its own set of partners with their own sets of needs. Nonetheless, one principle seems to hold true: *For a partnership to last, both partners need to benefit.* Both partners need to come to the table equipped not only with a list of needs, but also with a list of resources to offer. By opening the lines of communication in this way, both partners reach a better understanding of one another, and therefore any partnership they undertake has a greater likelihood of success.

Here's a glimpse at the kinds of resources that business and education can and do offer one another. The next section will expand upon and provide specific examples of partnerships that demonstrate these ideas.

What Business Can Offer Education:

Monetary donations from businesses to schools are perhaps the most common kind of contributions businesses make. According to a survey conducted by the Council for Aid to Education and the Conference Board, charitable contributions from the business community to schools in 1990 reached a record high of about $265 million—a 12 percent increase over 1989 corporate giving.

But while this is a significant amount, it is barely one-tenth of one percent of the total spent on K-12 education. (According to the Department of Education, elementary and secondary schools in the United States—both public and private—will spend $249 billion in 1991-92.) Clearly, looking at school/business partnerships strictly in terms of the number of dollars business can contribute limits what can be expected of such partnerships.

But business has other valuable resources to offer schools. These resources when combined with financial contributions can greatly assist schools in their reform efforts. These resources include organization and management skills, research and development resources, technology support, public relations and marketing programs, and coalition-building expertise.

Organization and management skills: Reorganizing to replace old structures and ways of doing things with new ones is never easy. The larger the organization, the more difficult and painful the reorganization is likely to be.

Yet many businesses have been through successful reorganizations. According to the National Alliance of Business's *Blueprint for Business on Restructuring Education*, business has learned through experience "what it takes to reorganize management; centralize or decentralize decision-making; contract out services; change management-employee relationships and responsibilities; and recognize and award employee performance." Business may be able to help educators think through the steps necessary in reorganizing their own institution.

Education can also benefit from corporate know-how in the area of strategic planning. Business models such as *total quality* which provide a framework for continuous improvement are relatively new to education. Effective partnerships can help schools successfully

implement such strategies to promote systemic change.

And performance assessment is still another area in which business can assist education. The overall effort should be not so much to replicate what business has done, but rather to study what business has learned and to apply that information judiciously to educational situations.

Research and Development: Business invests in its own future through research and development (R&D). While much business-related R&D is conducted internally, partnerships between business and higher education have produced many useful R&D projects. In fact, more than 70 percent of total corporate investments in education currently goes to colleges and universities.

R&D partnerships with K-12 schools are less common, but they can be quite successful—especially when a higher education partner is included. Areas of exploration for such partnerships include the development of better learning products, improved pedagogy and instruction, and better organization and management.

Technology Support: Most businesses spend a lot of money on technology. Through partnerships with business, education can more easily explore how technology might be used to meet specific instructional and information needs. Such partnerships might include cooperative sharing of resources, joint R&D ventures, and shared training resources, as well as the acquisition of hardware and software.

Public Relations/Marketing: Education in America is suffering not only from a lack of resources, but also from a poor image. By comparison, many businesses excel at creating sophisticated marketing and public relations strategies to promote themselves and their products or services. Business/education partnerships that use public relations and marketing skills to promote *educational values* have the potential to improve school programs as well as the public's perception of them.

Coalition-Building Expertise: While education has traditionally operated in isolation from other organizations, businesses have learned how to forge coalitions, and how to lobby for changes that benefit the business climate. Education may be able to learn something from business in the development of strategic links with other organizations such as human service agencies, businesses, and community organizations.

What Education Can Offer Business:

We lose the real power of partnership if we view education only as the source of the problem and business only as the source of the solution. Education has much to offer.

The U.S. Congress's Office of Technology Assessment (OTA) estimates that in any given year, at least 15 percent of the work force needs some new training. If business is to prosper, it will need to learn how to train and retrain its work force efficiently. Education can offer learning theory, teaching expertise, and facilities.

Learning Theory: During the past two decades, educational researchers have made great strides in understanding how people learn. The writings of such experts as Jerome Bruner, John Goodlad, and Howard Gardner have provided excellent guidelines for educators across the country who are involved in improving teaching skills, curriculum development, and assessment techniques. Business can profit from many of the findings of these and other educational researchers.

Pedagogy: In general, professional teachers know more about what makes for good teaching than business people do. Just as schools can benefit from the management and organizational expertise of business, so business can benefit from the pedagogical expertise of today's educators.

To address the education needs of its employees better, business could identify teachers who have demonstrated excellence in teaching and invite them to participate in education reform in the work place. While this is a new twist to business/education partnerships, those who pursue it are likely to find a new dynamic in the corporate classroom.

Facilities: A community's school system is often its largest organization—public or private. Yet, except for athletic facilities, the community's huge capital investment in plant and equipment generally goes unused outside of the eight-hour school day and nine-month school year.

Expanding the use of the school system's existing facilities offers powerful opportunities for school districts interested in partnering with business. For example, a business might help to fund the installation of an advanced communications system and computer network in an existing school building. In turn, the school system would allow the business to use the facilities during off hours for company training programs and other technology-based projects. Not only would such an arrangement represent a potential cost savings to both partners, it would also foster a deeper relationship and commitment to each other's success.

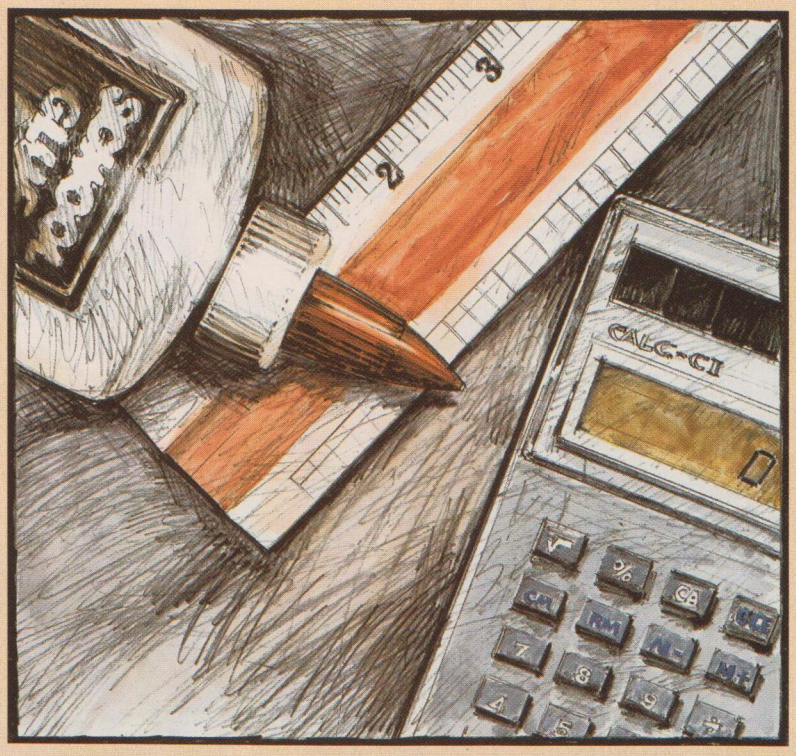
Conclusion

In many ways business and education share a common goal: the desire for a better-educated public. Business and education may view the agenda for achieving this goal from different vantage points, but it is clear that the two sectors are becoming increasingly interdependent. Effective partnering is a way to address—together—this important goal.

What Kinds of Outcomes Result from Effective Partnerships?

By Daniel E. Kinnaman

Supplemental funding for a school or district is the most common outcome of business/school partnerships. But if you only think money, you're missing the point. Effective partnerships produce outcomes besides financial aid—outcomes that may be even more effective in generating reform.

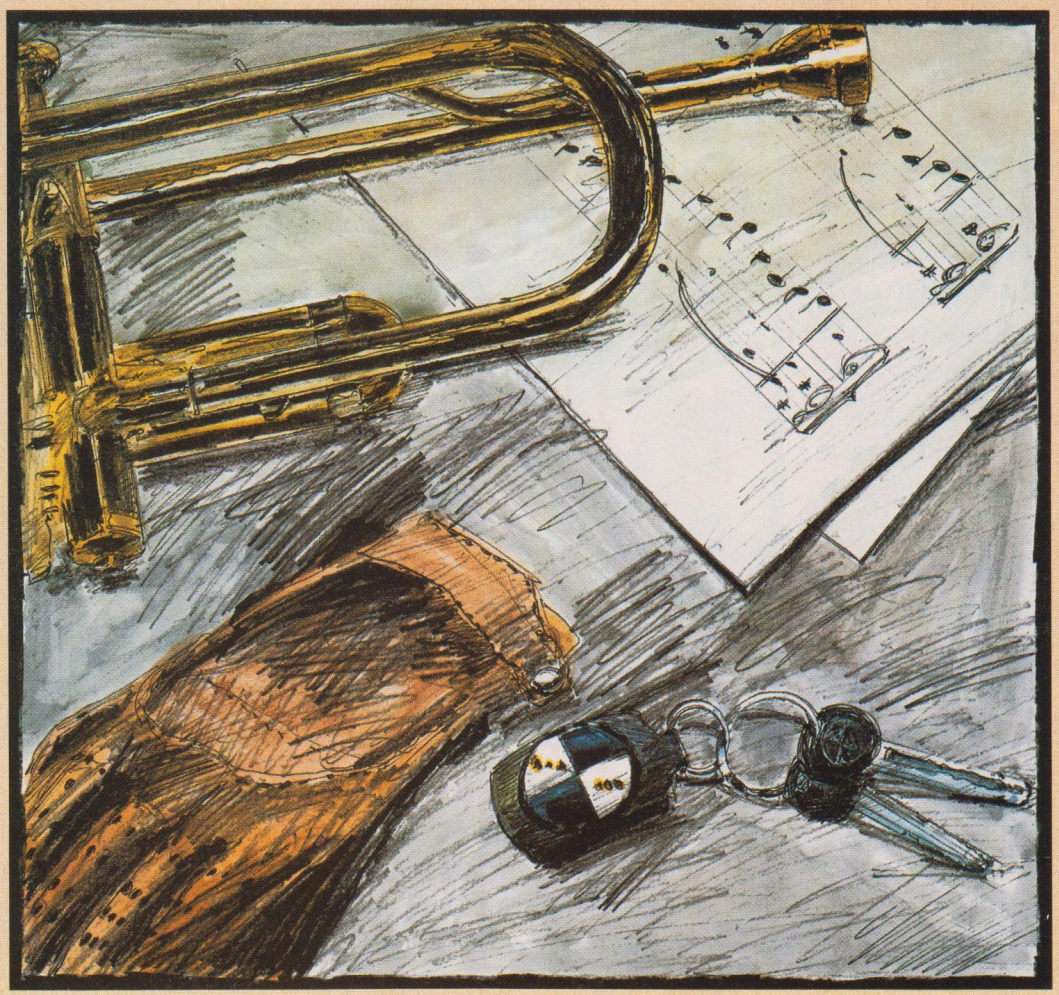


Along with the dramatic increase in the number of partnerships today, there is an equally dramatic shift in the *nature* of partnerships. No longer is a school/business partnership synonymous with a simple cash donation from a business to a school. Instead, partnerships are being developed around a set of *mutually beneficial outcomes* that both the business partner and the education partner are committed to achieving. Monetary assistance is often part of a partnership, but rarely are today's partnerships viewed as a one-way street. On the contrary, both schools and businesses are finding that there are many outcomes beyond monetary assistance that are worth striving for, outcomes that draw on the best resources of both partners for the good of the nation's students—and its work force.

The following pages present profiles of some of the most effective school/business partnerships in place today, and suggest a wide variety of outcomes or products that can result from such partnerships. As you read, you might want to ask yourself: Which ideas for partnerships could be best adapted to our own situation? Which could work best given our current resources and personnel? And which outcomes best meet our school or district's needs?

While educational improvement is the primary objective of most partnership efforts, you should also notice the many ways in which the outcomes of these partnerships benefit business as well as education.

Outcomes That Empower Teachers



Good teachers—those who are innovative in addition to being pedagogically strong—are critically important to the success of American education. Energizing these teachers—by providing them with more opportunities to interact and to try new ideas and approaches—is fundamental to education reform. School/business partnerships can help by focusing on the following outcomes:

Providing Opportunities to Update Skills and Knowledge:

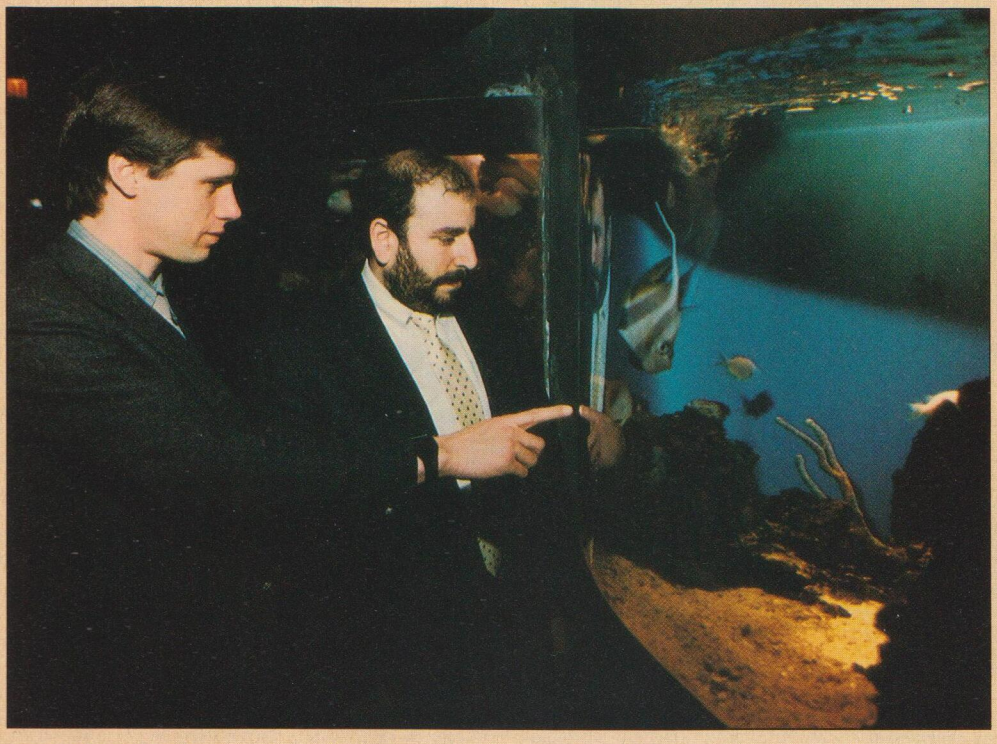
One of the most significant ways that school/business partnerships can empower teachers is by enhancing their opportunities for professional growth and development. This can be accomplished in several ways, including the following:

Sponsoring Conferences: A partnership between the School of Education at the University of Connecticut (UConn) and the Hamilton Standard division of United Technologies over the past few years has produced an annual science and technology conference for teachers in New York and Southern New England. This year, the conference will feature internationally known speakers from schools, universities, and industry in the areas of multimedia, telecomputing, and oceanography. It will also include a special session at the Mystic Marine Life Aquarium.

The partnership offers benefits to all of its partners. It provides teachers with updated information in science and technology, and tangibly recognizes their contribution and the importance of their profession. At the same time, UConn, Hamilton Standard, and the Aquarium benefit from recognition for their involvement, and the opportunity to influence science and technology education. In the long run, business also benefits from the contributions of students whose new interests in science and technology lead them to pursue professional careers in those areas.

Internships: Partnerships that give teachers the opportunity to work on a temporary basis in corporate-sponsored internships related to their fields of expertise also enable teachers to update their skills and knowledge. Polaroid and the schools near its Cambridge, Massachusetts, facility, for example, have achieved success through a program that enables local teachers to work at the company for a year.

Research positions and internships also provide a custom-made opportunity for fruitful three-way partnerships among K-12 schools, businesses, and institutions of higher education. For example, the Hoechst Celanese Chemical



Steven Lindia, (right) a former graduate student in science education at the University of Connecticut, coordinated the 1990 Hamilton Standard/UConn Challenger 7 Science Conference, the theme of which was "Science Technology and Environmental Education: Exploring Inner Space."

company, which makes the main ingredient in Tylenol, offers short-term research positions to teachers through a partnership program organized by Texas A&M University. This type of partnership enables the company to gain research support, it strengthens the University's relationship with the corporation and contributes to its capacity to conduct important research, and it provides participating teachers with opportunities to update their content knowledge while earning graduate credit and/or additional income. Hoechst also has the opportunity to influence student preparation in specific content areas through teacher development, and, through the teachers, to encourage student interest in those areas as possible career choices.

Offering Teacher Recognition:

Another way in which a partnership can empower teachers is through various kinds of teacher recognition. Such programs generally appeal to business because sponsoring companies become associated with quality. And of course these programs offer opportunities to showcase innovative teaching techniques.

Grant programs, traditionally philanthropic in nature, are a major vehicle for corporate recognition of teachers. Consider RJR Nabisco's five-year, $30 million *Next Century Schools* grant program. According to RJR Nabisco chairman and CEO Louis V. Gerstner, the program is aimed at "arming the insurgents." He wants to equip those educators that Deputy Secretary of Education and former CEO of Xerox David Kearns calls "responsible rule benders" with the opportunity to try radically different approaches. Enterprising and innovative teachers can garner three-year grants of up to $750,000 from RJR Nabisco to support school reform projects in their districts. This kind of funding empowers teachers and their schools to undertake comprehensive, long-term projects.

What's in it for RJR Nabisco? Plenty. Schools that apply for the Nabisco grants give Gerstner and his company an opportunity to participate in the process of educational reform where it counts most—on the front lines. Also, RJR Nabisco reaps the traditional benefits of philanthropically supporting education. And the company further benefits from having the opportunity actively to help shape the characteristics of tomorrow's work force.

In addition to offering grants, many corporations recognize outstanding teachers through awards programs which are publicized through the media. Award-winning teachers may then be offered consulting/speaking opportunities in both education and business circles, opportunities which can contribute significantly to both teachers' professional growth and to the understanding of educational problems within the business community. The major outcome of these programs for business is increased visibility and recognition for community support.

Recruiting New Teachers:

The federal government is projecting severe teacher shortages for the future, especially in science and mathematics. School/business partnerships are helping to close the gap by making it easier for employees in fields where there are current teacher shortages, such as engineering, to make a career switch to teaching.

For example, Digital Equipment's *Engineers Into Education* program enables retired engineers, and in some cases active employees, to complete the course work required for teacher certification at company expense. During this year alone, Digital's program will add more than 60 B.S. degree holders to the teaching profession.

Such programs benefit both the schools and the businesses that participate in them. In addition to gaining new teachers in science and math, schools that employ second-career teachers also gain the years of practical experience and content application that these new teachers bring from their corporate careers. And the positive publicity that businesses enjoy through such programs helps to make them attractive employers to young people. Businesses also gain the opportunity to support the curriculum in areas they believe to be important (such as engineering) by encouraging employees with expertise in those areas to volunteer.

Involving Teachers in Research:

Endowments are a common mechanism for involving university faculty in research-based partnerships between business and higher education. Technology-related examples include Sony's endowment of a $3 million chair in computer engineering at the University of Illinois, and LEGO Educational Systems' creation of a $1 million LEGO chair at the Massachusetts Institute of Technology to support the work of Logo pioneer Seymour Papert. The primary incentive for business in establishing these endowments is directly connected to the companies' research-and-development efforts.

Such direct support for research is not as common at the K-12 level. Yet the idea of endowments may be worth considering. K-12 endowments might focus not on research, but on supporting particular functions within the school organization. And the person who assumes a chair might also provide training, consulting, or research results to the business that endowed the chair. Organizationally, the school benefits because the stable funding offered by an endowment allows the school to focus its attention on a selected area of technology (or other area of importance) without fear that budget cuts will undermine the school's progress in that area.

Outcomes That Expand Student Learning

Children comprise only about 25 percent of our population, but they represent 100 percent of our future. Helping them to learn more, and to like learning better, is central to a strong system of education. Successful school/business partnerships can have a significant effect on student learning through the following outcomes:

Providing "Real World" Opportunities and Experiences:

When students see the connection between what they study in school and what's happening in the real world, their learning becomes energized. Partnerships whose outcomes include bringing the "real world" into the classroom can be

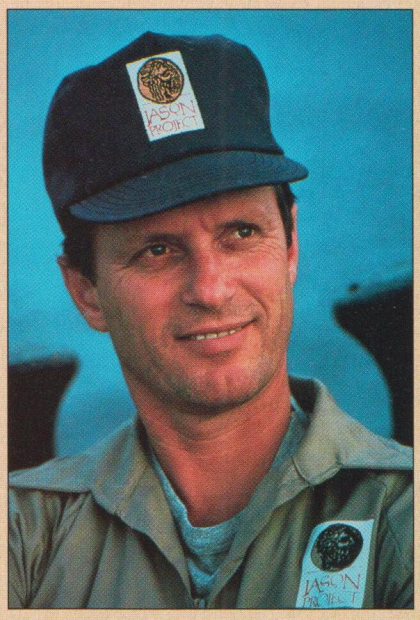
particularly effective in enhancing student learning. The mechanisms for doing this might include:

Supporting projects that feature "real world" experiences: Bob Ballard, director of the Center for Marine Exploration at the Woods Hole Oceanographic Institution, didn't set out to launch a school/business partnership. He just went looking for the world's most famous shipwreck—the *Titanic*. Armed with the newest and most advanced technology available, he succeeded in locating the ship and became an instant celebrity—especially in the eyes of schoolchildren. After receiving letters from more than 16,000 students asking how they could get a job like his, Ballard decided to include them via satellite hookup on his next expedition. The result is a school/business partnership that, in less than three years, has enabled hundreds of thousands of students to "explore the mysteries of the deep" with Ballard and his crew.

The partnership, called the Jason Project, receives corporate support from Cray Research, Electronic Data Systems, the National Geographic Society, and Turner Broadcasting. In support of the project, the National Science Teachers Association has developed a 50-hour pre-expedition curriculum. The curriculum helps to prepare students for a two-week electronic field trip in which they interact with Ballard's team of explorers and see Jason's discoveries in real time as they are transmitted from Ballard's floating laboratory.

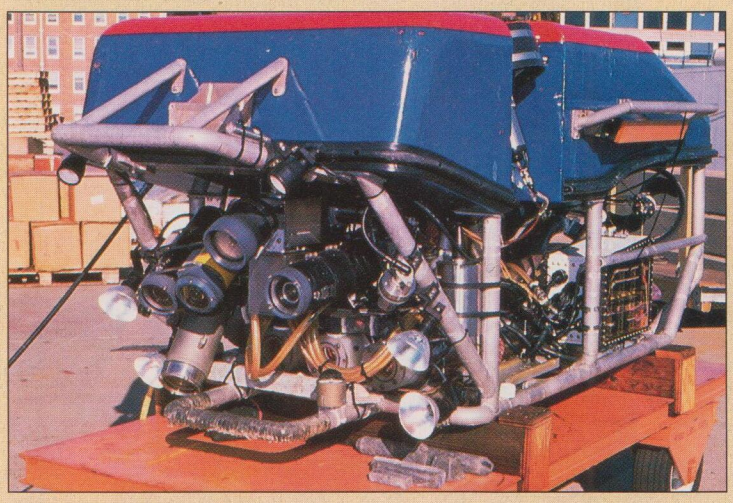
The Jason Project offers students the opportunity to experience science as it exists in the real world, an extremely powerful and motivating kind of learning. In addition, it enables participating businesses to gather genuine data about the technical effectiveness of the advanced telecommunications technology used to connect Ballard to students in classrooms across the nation.

There are many projects closer to home that offer similar benefits to the schools and businesses involved in them. For instance, one Connecticut teacher is currently working with two local bankers to set up a mock bank in her sixth-grade classroom. Through this low-cost, high-impact partnership, the classroom gains the excitement of learning real-world financial skills, and the bank gains good publicity—providing a much greater return on its investment than it might receive through a more costly advertising campaign.



Dr. Robert D. Ballard (above), a senior scientist at the Woods Hole Oceanographic Institution, heads The JASON Project.

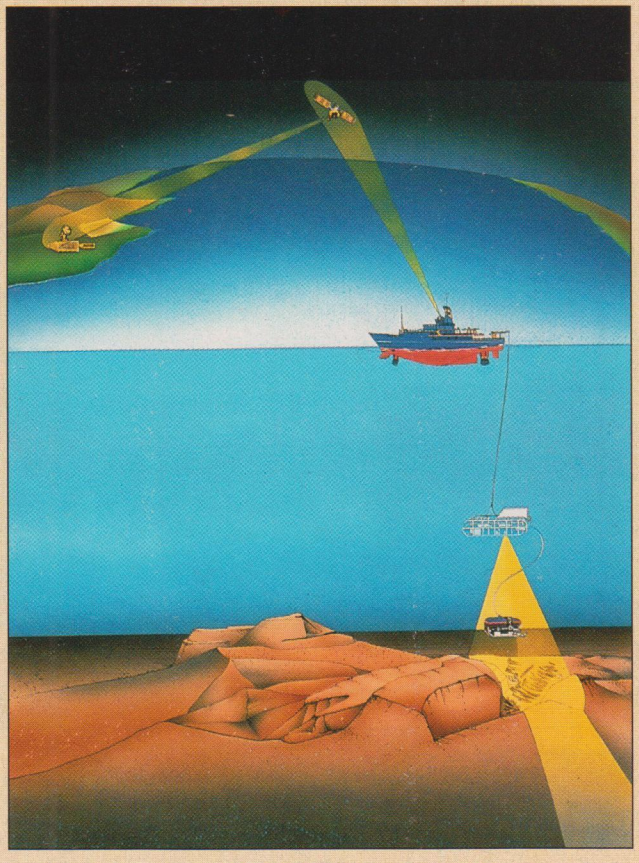
Offering Apprenticeship Programs: School/business partnerships are also providing students with real business experience by sponsoring apprenticeship programs. For example, Rockwell International's *Advanced Career Training Program* provides high school students who otherwise might not be motivated to finish



The remotely operated vehicle JASON.

school with an opportunity to work directly with Rockwell employees in an apprenticeship setting. The program helps students to see how their high school courses can help to prepare them for careers in fields such as electronic imaging, telecommunications, and engineering—careers they may never have heard of before. Rockwell benefits by assuring better student preparation for work at its company and more realistic expectations of the work environment.

Few school/business partnerships have tapped the full potential of apprenticeship programs, and there are many effective variations of the traditional model yet to be discovered. The state of Oregon, for instance, has passed legislation for a state-wide apprenticeship program aimed at non-college-bound students. The state is planning to offer tax credits to businesses as an incentive for setting up such programs.



Artist's rendition of the completed ARGO/JASON system with satellite transmission capability.

Motivating Students in Science, Mathematics, and Engineering:

According to New Hampshire inventor and entrepreneur Dean Kamen, education isn't suffering as much from a lack of resources and know-how as it is from low prestige and public apathy. He claims that business can best help education by applying sophisticated marketing/public relations techniques to help create a demand for quality education.

To this end, Kamen has formed a company, U.S. FIRST, dedicated to raising interest and performance in math and science to the same level as our country's interest and performance in professional athletics. The company has developed a series of marketing promotions and events to celebrate and popularize science, math, and technology both inside and outside of the classroom.

One such promotion, an incentive program called FIRST Points, awards "stamps" to students for their work in science and mathematics. These "stamps," donated by businesses and distributed by teachers, can be exchanged for prizes at business locations throughout the community. Participating businesses, including M&M/Mars and McDonald's, like the program in part because the FIRST Points stamps serve as a promotional vehicle for each participating company. And educators find that students are responding in positive ways. In fact, the National Science Teachers Association has endorsed the program.

U.S. FIRST also sponsors a FIRST Encounters contest which brings together 40 teams—

Sharon Smith (6th grade), won a three hour helicopter ride through the FIRST Points science and math incentive program.

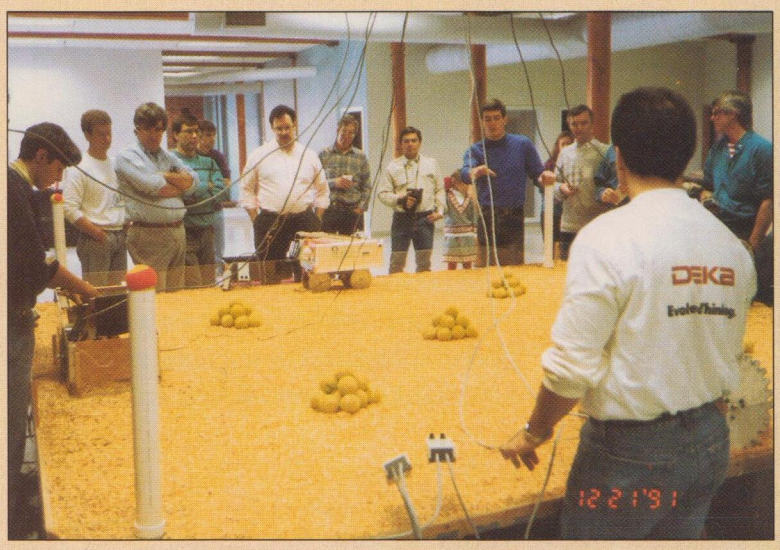
including representatives from companies such as Motorola, Boeing, and Xerox; various institutions of higher education including Harvard and Rensselaer Polytechnic Institute; and high school science classes—to compete for a national championship in the "sport" of design engineering. The contest is being conducted with all the excitement of a major sporting event, complete with referees, cheering fans and concession stands.

Of course, students benefit from working with the highest-quality professional design engineers. But the companies and institutions of higher education also benefit: Not only are they given the opportunity to influence the career choices of some very capable high school students, but they are also afforded the opportunity of working with young minds that have the potential of bringing new creativity and freshness to design engineering.

Increasing College Attendance and Job Placement:

Businesses have been granting scholarships to students for years, but in recent years, scholarships have gained a new emphasis. Instead of just awarding scholarships to graduating high school seniors in recognition of what they've already accomplished, more and more companies are working with schools to offer scholarships as incentives to students for what they have *yet to accomplish*.

For example, the Federal National Mortgage Association has set aside $1 million for a project which will award a $500 scholarship for college tuition to every student at Washington, D.C.'s Woodson High School who manages to get all As and Bs during any given semester. In a similar program in Detroit and Dallas, Pepsico is awarding $250 per semester to every student who maintains at least a C average, attends school regularly, and stays drug-free. And other companies, including Comerica Bank in Detroit, are offering guaranteed jobs to students who



Contestants in the FIRST Encounter "Maize Craze" contest design and build machines that collect and defend tennis balls, demonstrating engineering flair.

meet certain standards for academic achievement and attendance but who don't choose to go on to college.

Merrill Lynch's Scholarship Builder program may be the most innovative and ambitious project of its type. The project has committed to paying the college or vocational school tuition costs of some 250 first-graders in ten cities. These students will graduate from high school in the year 2000, by which time Merrill Lynch hopes to have $16 million in its scholarship fund.

Why does business put up such huge sums of money? These projects further two important business goals: to improve the preparation of entering employees and to enlarge the pool of qualified applicants.

Providing Instructional Support:

Another outcome that expands student learning is one that provides the support that many students need to succeed. Mentor/tutor programs are one of the most popular means of providing such support.

In mentor/tutor programs, adults from outside the educational community are invited into the classroom to work with children in developing and strengthening basic skills. While the participants are the primary beneficiaries, businesses gain visibility and recognition for their support of such programs, and also have an opportunity to provide instructional support in fields which are important to their industry (such as electronics).

Eastman Kodak has become a corporate pioneer in this area. This year alone, as many as 3,000 Kodak employees will serve as mentors or tutors in the Rochester, New York, schools where the company's headquarters is located. In a similar program with a different twist, Amoco has offered to donate $20 to a school for every hour that one of its retired employees volunteers at that school. And Chrysler has begun a new program called *World of Work* which gives employees time off to tutor schoolchildren in using computers and conducting science experiments. *World of Work* is the first school/business partnership to win a "Point of Light" award from the Bush administration. Programs such as Chrysler's give businesses an opportunity to influence curriculum directly in areas that impact them.

Updating the Curriculum:

The recent emphasis on curriculum revision in science and mathematics education is a good example of the concern that educators—and businesses—have for energizing the curriculum. A current partnership that focuses on updating the curriculum involves American Airlines, Burlington Northern, Tandy, and schools in Forth Worth, Texas. Entitled *C3*—for community, corporation, and classroom—the project is designed to help all students learn the math they need to know for the jobs that will be available when they graduate.

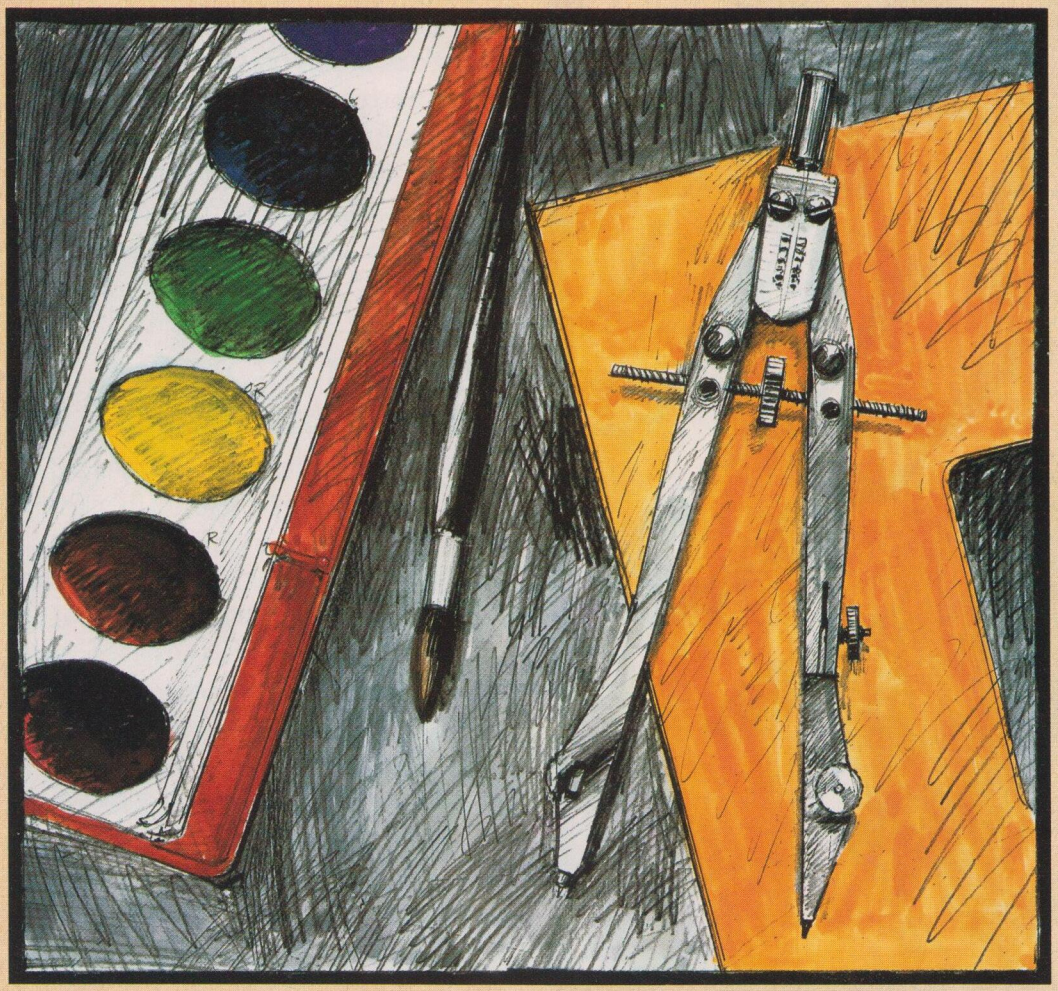
The project points to an important role for business in helping schools with the process of curriculum renewal: the need to communicate clearly to educators the expectations of business regarding the skills and knowledge that it anticipates its future employees will need. If the project is successful, not only will it yield gains in student achievement, it will also directly benefit the participating businesses—all major employers in the Fort Worth area—by better preparing the local population for employment.

Outcomes That Improve Organization and Management

When the words *organization* and *management* are mentioned, school/business partnerships are all too often thought of as a one-way street. That is, there seems to be a built-in expectation that business has all the management and organization solutions and education has all the problems. While it is true that business more visibly tinkers with its management skills and organizational structure than schools do, partnerships in this arena can lead to a number of positive outcomes, including the following:

Sharing Facilities:

One such outcome is the opportunity to share facilities—the physical space and technological equipment that both businesses and schools need to do their respective work. A Manhattan high school recently partnered with Phillip Morris to build a



model office at the school. The facility, with its up-to-date equipment, has made the school's business education classes far more realistic. And company personnel have been afforded an opportunity to come to the school and help teach those high school students who are about to join the work force in their community.

Such a partnership holds several benefits. First, students gain an extra sense of pride and importance in their work by knowing that they are working with real business equipment. Second, the school's business and technical training curriculum is likely to be revised over time to reflect the real needs of the work place.

This, in turn, increases the business partner's confidence in hiring students from the program. And finally, the model office provides an ideal setting for the business itself to train its current employees during non-school hours.

To date, organizational strategies for sharing facilities through school/business partnerships have not been vigorously pursued—but that does not mean that they shouldn't be. There are numerous, mutually beneficial opportunities for schools (especially at the secondary level and above) and businesses to share resources. For example, a school/business partnership might be established to create a shared technology center to which a coalition of small- to mid-sized local businesses contribute sophisticated graphic design equipment. Students could then be taught to use the equipment, with advanced students creating customized work for the businesses as part of their class requirements. Such a center would enable the participating businesses to avoid redundancy in securing technology and training resources, and it would offer yet another opportunity for students to connect learning with the "real world."

Improving Planning Strategies:

An increasing number of education and business leaders believe that the planning strategies that work in business can be adapted to work in education—and some have even formed partnerships to test their ideas.

For example, Xerox is working with schools in California, New York, and Virginia to apply the principals of its *Quality Management Process* (QMP)—which focuses on a team approach to planning—to the school setting. Employees from the company work full time with education leaders to customize the process to meet the needs of individual schools and districts.

Through this partnership, Xerox gains valuable feedback about the effectiveness of its QMP model in different organizational settings. What the company learns through its experiences with school partnerships can be applied to its own management planning. In addition, educators gain firsthand experience with various business procedures, building better understanding of planning procedures on "the other side of the fence."

Creating New Models for Schooling:

Perhaps the most comprehensive organization/management outcome of a school/business partnership is the creation of an entirely new school. An example is the *Corporate/Community School of America* (C/CSA) in Chicago. C/CSA is a not-for-profit, inner-city elementary school on Chicago's West Side, founded by Joseph Kellman, president of Globe Glass & Mirror Company. Currently the school enrolls about 250 students from two to 13 years old. Operating costs average approximately $5,100 per student, similar to the per-pupil costs of public schools.

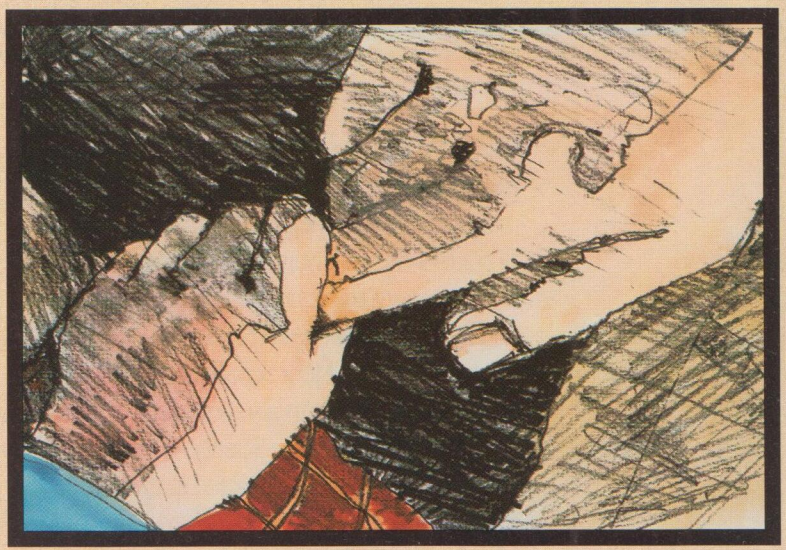
But that may be where similarities to public schools end. C/CSA is run much like a business. Elaine Mosley, who carries the titles of both principal and CEO, treats her teachers as executives with management authority and responsibility. The school is governed by a 15-member board of directors, which includes educators and parents as well as corporate executives from companies such as Quaker Oats and Sears. And while teachers make above-average salaries, there is no tenure.

If standardized test scores are any indication, C/CSA works: So far, student scores in reading and vocabulary have risen markedly for the three years the school has existed.

C/CSA's corporate partners make a three-year commitment to fund the project. In return, they receive much positive publicity for their reform efforts, and sit on the governing board. After three years, the partners' commitment is either renewed or discontinued, based on the success of the school in reaching its goals.

Providing Equipment:

A school/business partnership in Fairfax County, Virginia, has dramatically increased the capacity of a local high school to offer students a high-quality technical education in part by providing specialized equipment to that school. The Thomas Jefferson High School for Science and Technology is a magnet school that grew from shared concerns of education and business leaders about predictions of severe shortages of graduates qualified to pursue science and technology careers. The school opened six years ago and so far has received more than $5 million in support from businesses such as Honeywell,



Students at the LEGO TC LOGO test school in Hartford, CT, with the LEGO TC LOGO turtle—a two-motor programmable robot.

Martin Marietta, and TRW. Most of the support has been in the form of donated equipment and materials that have helped the school to establish 11 state-of-the-art laboratories in areas such as biotechnology and robotics.

The results? Last year Thomas Jefferson had the most National Merit Semifinalists in the nation, and 16 students also finished in the top 300 in the Westinghouse Science Talent Search. The companies that participated in this partnership will benefit directly as these students complete their education and pursue technology-related careers.

Establishing Pilot or Reference Sites:

A school can also serve as a site for piloting a business's product. Clearly, the educational aims of the school must match the nature and quality of the product tested. Nonetheless, there are many companies that market products and services to schools which would serve as appropriate partners. LEGO DACTA, for example, has used schools as reference sites in the development of many of its LEGO TC Logo products. Many other technology and software companies do the same.

Outcomes That Build Coalitions

Education is everybody's business. A community that understands this principle works to develop strong coalitions in support of its schools, and strong coalitions invariably result in schools with an increased capacity to achieve educational excellence. School/business partnerships can result in several important coalition-building outcomes, including the following:

Building Better Understanding:

One of the most effective ways of building better understanding between schools and businesses is through the process of shadowing. Shadowing simply means following in someone else's footsteps for a period of time.

In San Francisco's *Principal-for-a-Day* program, initiated by school superintendent Ray

Cortines, Bay Area CEOs spend a day in one of the city's schools, shadowing its principal. Through the program, business leaders gain a new understanding of, and appreciation for, the management skills and commitment of school principals.

Education leaders, in turn, could clearly benefit from shadowing selected business executives, culling from them organizational and management skills that might be applied to school or district problems, as well as gaining better understanding of how businesses work. Shadowing costs very little, and provides the increased understanding that is critical to expanding community coalitions and building effective, on-going partnerships.

Enlisting Community Leaders to Lobby for Education Reform:

An example of the potential of school/business partnerships to create momentum for education reform is the Lehigh Valley partnership in southeastern Pennsylvania. This partnership is an action-oriented coalition of 20 school superintendents, 25 chief executive officers, and ten college and university presidents, all of whom are dedicated to promoting educational excellence in the communities served by the partnership.

The kind of forum created by the Lehigh Valley Partnership is a very powerful vehicle for reform because it brings together a large group of influential decision-makers to address education issues that affect each of their respective organizations. By creating such a forum, the partnership decreases dramatically the amount of time and effort it takes to gain community-wide support for major educational reform initiatives. It also promotes shared responsibility for the success of the education system among a number of power brokers in the community.

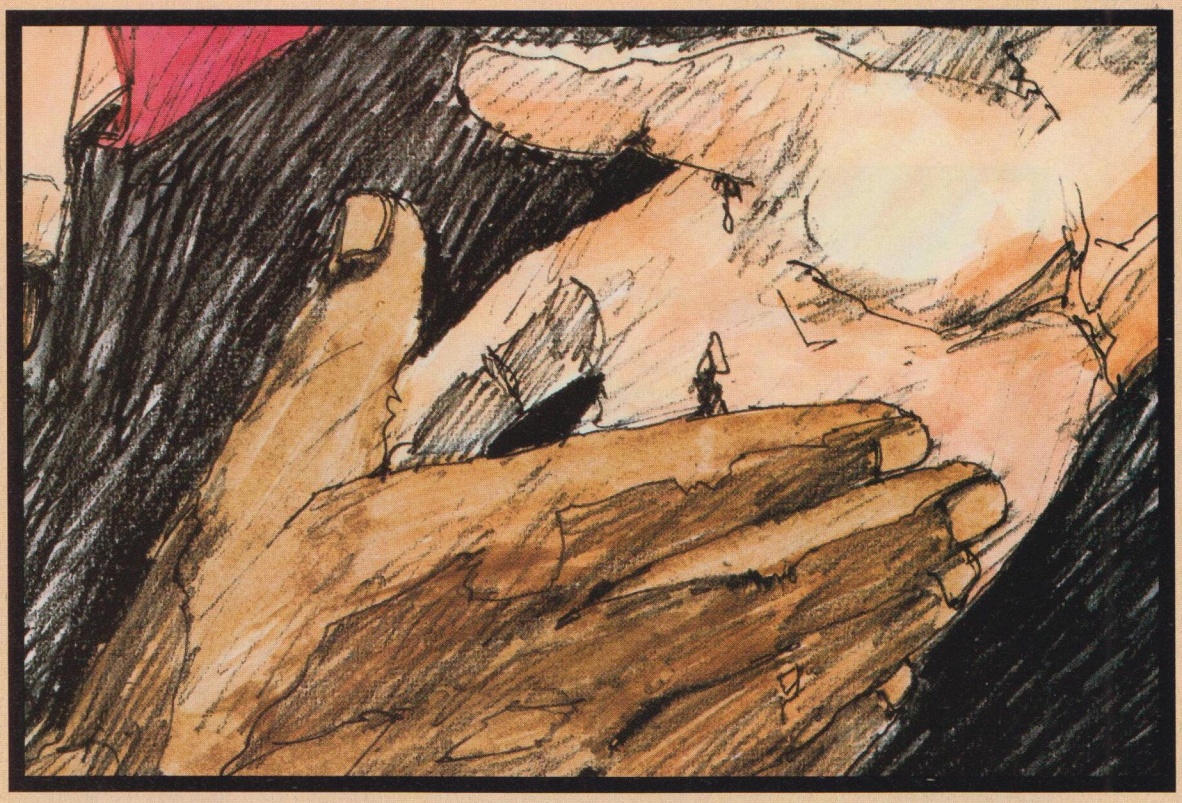
Turning Schools Into Community Learning Centers:

An increasing number of school/business partnerships foster school transformations into community learning centers. One example is a project initiated by Cities In Schools of Marin in San Rafael, California. Cities In Schools is a national non-profit organization that facilitates the development of partnerships for the benefit of schools with at-risk youth. The Marin chapter recently set up an office at an elementary school located in an area of San Rafael that has experienced a tremendous influx of immigrants over the past decade. Cities In Schools of Marin has created dozens of partnerships with community businesses and agencies that have turned the school into an effective community learning center. According to the chapter's executive director Marlene Jones Schoonover, not only do schoolchildren benefit during the day, but after hours the school is used for adult vocational education, for ESL classes, and for the delivery of various social services.

School/business partnerships that extend the use of the nation's existing education facilities to support the learning needs of the adult community yield several important outcomes. They develop strong community support for schools. And they provide adults with relatively easy access to the training they need in order to improve their marketability in the work place.

Gaining Experience for Tomorrow's Partnerships:

No matter how a school/business partnership turns out, experience is an important outcome that every partnership can count on. One notable example is *The Boston Compact*—a five-year school/



business partnership agreement that began in 1982. The compact was a comprehensive written agreement between the city's school system and its business community that focused on connecting schooling with employment. It began with much enthusiasm and commitment and ended with mixed results, mixed feelings, and a number of unmet objectives.

After first balking at a proposal for a second compact in 1988, the compact's partners agreed that, despite its deficiencies, the experience gained during the compact's first term provided substantial hope for a more successful second term. They subsequently designed a second compact, developing and emphasizing new goals and strategies to address problem areas uncovered during the first compact.

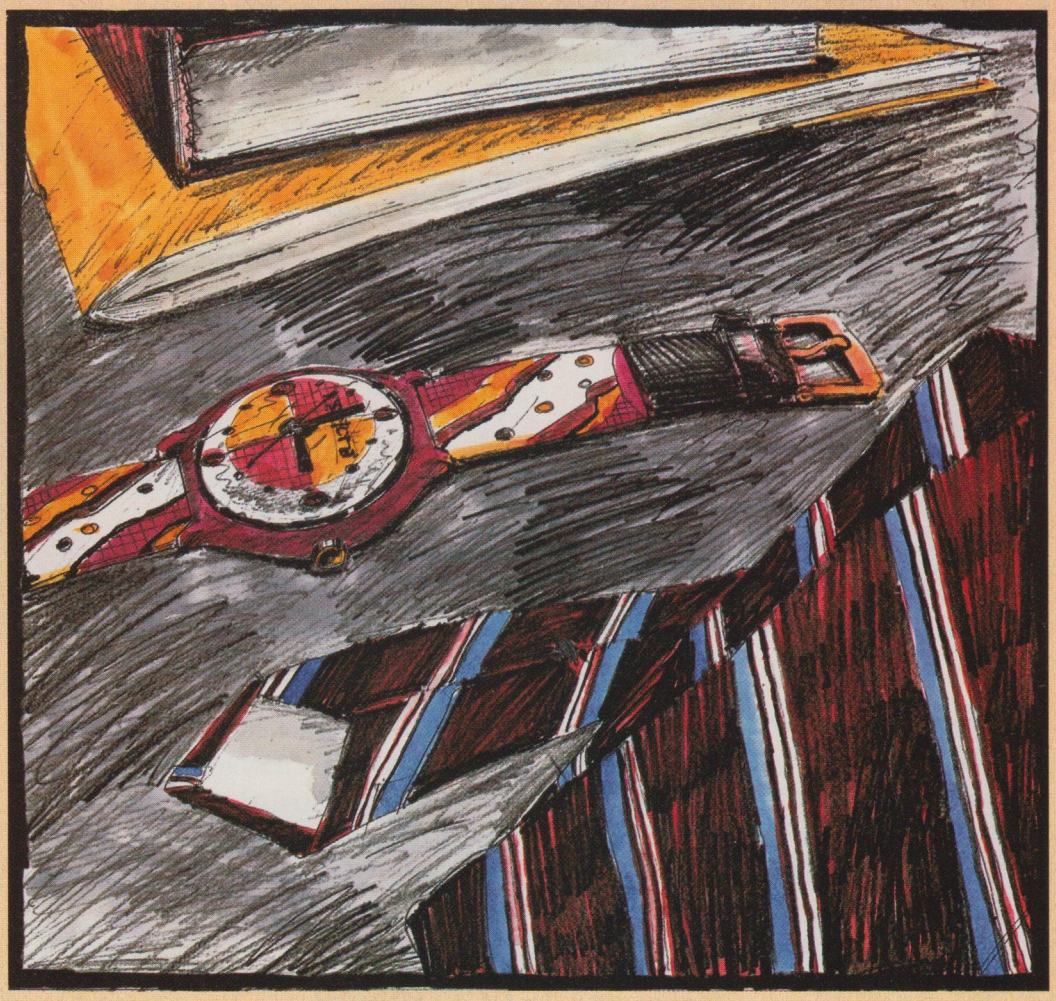
The Boston Compact has influenced other school/business partnerships. For example, the National Alliance of Business (NAB) drew from the experience of the Boston Compact to develop a set of general principles that could be used by other cities to develop similar projects; more than a dozen cities across the country have done so.

Conclusion

Lessons learned from other partnerships can serve as an important resource to you in developing effective partnerships of your own. While we've highlighted a variety of outcomes from a number of examples, the potential is limited only by your imagination and your ability to listen carefully to your partner's concerns, issues, and capabilities. Focusing on outcomes is more likely to lead to true partnerships where each partner benefits, and will work to continue the relationship.

Where to Look for Partners

By Gail Morse



In drawing up a list of potential partners, most educators start—and end—with a dozen familiar Fortune 500 names. But in fact, there are many potential partners to consider, partners that come from all segments of the local and national community.

Establishing partnerships is not a one-time activity. Rather, it is a process that evolves through various stages, a process fueled by communication, commitment, and careful planning.

Perhaps the most important first step towards a successful partnership lies in choosing the best partner for the project at hand. But how do you go about finding the right partner? The basic steps are as follows:

- Start with a vision. Decide how you want to improve the educational experiences of your students.
- Conduct a needs assessment. Determine what you need to move from where you are now to where you want to be in one, three, and five years down the road.
- Establish a list of outcomes for your partnership that will meet your objectives for improvement.

• Draw up a list of potential partners. In doing this, consider not only your own needs but also the needs (as you perceive them) of the partners you're considering. Target the companies that can best meet your needs *and* that may have needs that you can meet.

• Organize your list so that you approach your best prospects first.

• Write up a proposal for each partner you approach. In the proposal, state clearly the outcomes you hope to achieve through the partnership. Be sure to include not only what you want, but also what you have to offer.

• Remember that the first draft of the proposal is only a talking paper. Be prepared to refine and amend the proposal as part of the process of building a partnership.

Remember that not all partnerships require the resources of a large corporate donor. Many of your objectives can be achieved through effective local partnerships with parents, civic organizations, local businesses, government agencies, and community groups.

The following pages suggest some of the many partners you might consider in setting up a partnership.

Parents: The First Partners

Educators who are skilled at building partnerships know that parents are excellent first partners for any school. Depending on their areas of expertise, parents can serve as tutors, technology consultants, speakers, small group discussion leaders—and in many other roles. Moreover, parents can provide entrees to local businesses and community organizations that might also serve as partners.

The Business Community

This category encompasses a widely diverse group of resources from the largest multinational corporations to small local businesses.

Large national corporations are generally most appropriate for partnerships that require extensive resources—either financial or otherwise. Competition is stiff for these corporations' resources, but if you have an idea for a partnership that will mesh with the goals of a large corporation, it's worth a try. And don't forget that many large corporations have an interest in building good relations *within their local communities*. If you are fortunate enough to have a large corporation in your backyard, you may want to consider how your partnership might help them improve their "good neighbor" status.

For most projects, smaller businesses can also be excellent partners. In fact, these businesses may be more receptive because they are less overwhelmed with requests from grant-seekers. Small businesses that are franchises—such as local fast-food restaurants—may be good partners if they are given the autonomy from corporate headquarters to develop partnerships at a local level.

Business Trade Organizations

Local business trade organizations, and local chapters of national business organizations, can also help build partnerships. Sometimes they can point you in the direction of likely business partners; others might be willing to partner directly with you. Business trade organizations include these:

• chambers of commerce,

• business roundtables,

• associations of businesses in local malls,

• business-related clubs (Rotary, Kiwanis, Jaycees),

• associations of tradespeople (e.g., plumbers, carpenters),

• associations of professionals (e.g., realty boards),

• better business bureaus.

On a national level, you'll find resources to support partnerships from such groups as the National Alliance of Business, The Business Roundtable, and the National Association of Partners in Education.

Foundations

If you're looking specifically for grants, you'll probably want to look into the charitable programs set up by foundations. These organizations come closest to offering educators support without restrictions. The world of foundations can be subdivided into the following categories:

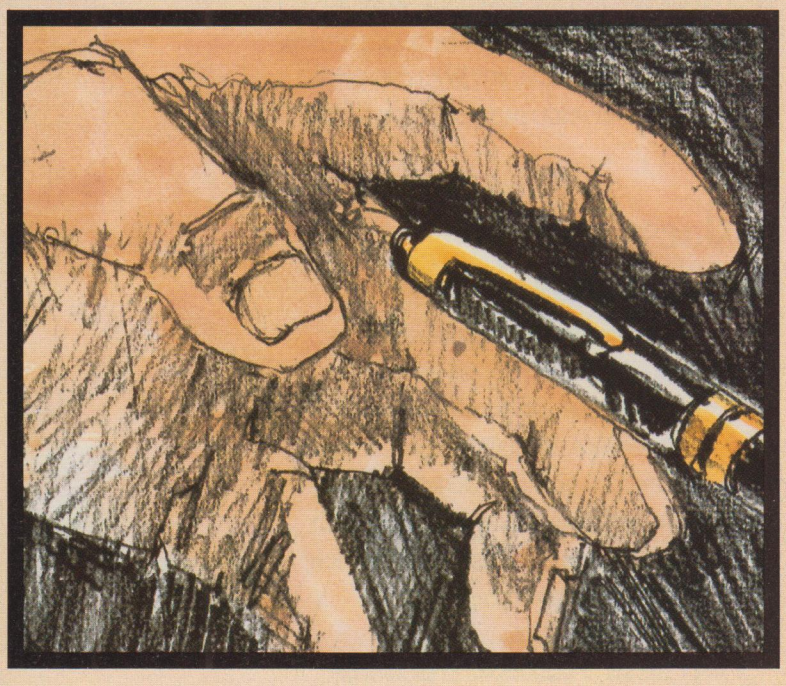
• National foundations. These philanthropic foundations do not limit their grant support to any geographic area. Examples are the Ford Foundation, Lilly Endowment, Rockefeller Foundation, and the Carnegie Corporation.

• Special interest foundations. These organizations offer support in targeted areas of interest. Examples include the Robert Wood Johnston Foundation (health) and the Joseph P. Kennedy Foundation (mental retardation).

• Corporate Foundations. Set up as the giving arm of large businesses, these groups include the Sears Roebuck Foundation, the Hewlett-Packard Foundation, and the Exxon Education Foundation.

• Community Foundations. There are approximately 300 community foundations spread across the country, with total assets of approximately $3 billion. Examples include the Cleveland Foundation and the New York Community Trust.

Any reference librarian can lead you to books, directories, and other information on how to tap the resources of foundations.



Civic Organizations

Civic organizations, which offer excellent opportunities for partnerships, are often overlooked. While many civic organizations have fewer dollars to donate than large corporations, they often have greater *in-kind* resources to share. And many also have long histories of volunteerism in philanthropic projects.

Among the civic organizations you may want to contact are community service groups, fraternal and sororal groups, social groups, athletic groups, senior citizen groups, public concern groups, religious groups, and youth groups.

To learn where to contact these and other volunteer groups in your state, contact your governor's office on volunteerism. If no such office exists, ask your governor's office which state agency coordinates private sector initiatives and volunteerism.

The Educational Community

Another easily overlooked resource for partners includes other schools (at all educational levels). Because the goals of schools are often quite similar, fruitful partnerships are often easier to plan. Partnerships that pair K-12 schools with institutions of higher education are also quite useful. Check out the following:

- local public and private schools at the elementary, secondary, community college, and university levels;
- adult education programs;
- employment and training consortia;
- educational support groups (PTA councils, Junior Achievement).

Local Government

Every community has agencies of state and local government that can be sources for partners. In your search, include these:

- elected officials and their agencies,
- fire and police departments,
- community agencies,
- non-profit agencies,
- health-related agencies.

Cultural and Special Interest Groups

Cultural and special interest groups offer areas of expertise that help to create unique alliances. When the National Endowment for the Arts launched its arts-in-education program in the 1970s, thousands of creative artists became involved in school partnerships. Some of the areas in which to look for partners include art leagues, artists' societies, friends-of-the-arts clubs, dance organizations, music groups, community choirs, orchestra and concert associations, oratorio singers, drama/theater groups, museums, art galleries, historic preservation groups, beautification committees, garden clubs, great books clubs, and literary societies.

Conclusion

Partnerships can help to prepare our students to assume productive roles in the 21st century. They can also bring together our educational system with community resources for the benefit of our students' intellectual, social, moral, and physical development.

How to Get More Information

By
Ellen R. Bialo and
Jay P. Sivin-Kachala

A large array of information resources is available to schools and districts interested in developing partnerships with business, institutions of higher education, and the local community. Some of the most helpful recent publications are listed below.

Articles

"Partnerships 101." *(May 1989) By A. H. Diffily.* Currents, *Vol. 15, No. 5, pp. 8-12.* Suggests how colleges and high schools can develop partnerships that are beneficial to both partners. Examples are provided.

"How to Organize Successful Parent Advisory Committees." *(October 1989) By W. B. Jennings.* Educational Leadership, *Vol. 47, No. 2, pp. 42-45.* Discusses the formation of site councils as a vehicle for establishing home-school-community partnerships for school improvement.

"Partnerships: Getting a Return on the Investment." *(October 1989) By M. A. MacDowell.* Educational Leadership, *Vol. 47, No. 2, pp. 8-11.* Addresses the time interval between a school-business partnership investment and the results. Highlights several successful partnerships. Provides general guidelines for establishing school-business partnerships.

"What Makes School-Business Partnerships Successful?" *(May 1991) By J. J. Caton and S. P. Krchniak.* Business Education Forum, *Vol. 45, No. 8, pp. 3-6.* Presents key elements necessary for successful school-business partnerships. Describes two such partnerships.

"Will Your School-Business Partnership Stand the Test of Time?" *(November 1990) By J. B. Schwartz.* NASSP Bulletin. Suggests questions to consider when planning for the long-term success of school-business partnerships.

Books and Other Publications

American Business and the Public School: Case Studies of Corporate Involvement in Public Education. *M. Levine and R. Trachtman, Eds. New York: Teachers College Press. $26.95.* Appraisals of pioneering examples of business-education partnerships that have influenced school funding, programming, and policy at the national and local levels.

Bring Business and Community Resources into Your Classroom. *Washington, DC: National Education Association. Free.* NEA's "how-to" handbook on building partnerships to access business and community resources.

Business and the Schools: A Guide to Effective Programs *(Second Edition). (Due March 1992.) New York: Council for Aid to Education. $20.00. Phone: (212) 689-2400.* An updated compendium of corporate programs to reform public schools. Will include an inventory of the characteristics of promising programs.

The Business Educationary: A Business Guide to the Language of Education. *(1991) Washington, DC: Center for Workforce Preparation and Quality Education. $15.00, with quantity discounts. Phone: (202) 463-5525.* A glossary of often-used terms in education reform. A tool for getting local business partners quickly "up to speed" on the issues that confront the schools.

The Business Roundtable Participation Guide: A Primer for Business on Education. *(1991) New York: The Business Roundtable, 200 Park Ave., New York, NY 10166. Free. To order, write or fax: (212) 682-0194.* Guidelines for developing business-school partnerships to bring about educational restructuring. Written from a business viewpoint, but valuable for educators as well.

Business/School Partnerships: A Path to Effective School Restructuring. *(1991) By D. W. Rigden. New York: Council for Aid to Educa-*

tion. $15.00. Phone: (212) 689-2400. Describes how businesses can make partnerships a vehicle for genuine school reform by linking them with the restructuring efforts of schools and school districts.

Business Strategies That Work: A Planning Guide for Education Restructuring. *(1990) Washington, DC: National Alliance of Business (NAB). $15.00. Phone: (202) 289-2888.* Guidelines for building business-education-community coalitions for the purpose of educational restructuring. Written from a business viewpoint, but the guidelines are valuable for educators as well. Includes four case studies.

Community Relations Kit. *(1990) Palo Alto, CA: Computer Learning Foundation. $7.50.* A comprehensive guide to beginning a school community relations program.

The Compact Project: Final Report. *(1991) Washington, DC: National Alliance of Business (NAB). $5.95, with quantity discounts. Phone: (202) 289-2888.* An overview of the Compact Project, which involved 12 communities attempting to build effective partnerships among school, employers, local elected officials, and at-risk youth. Includes a description of each community's partnership. (For a more extensive treatment, NAB publishes *The Compact Project: School-Business Partnerships for Improving Education,* which costs $14.00.)

Directory '92. *(Due January 1992.) Ellenton, FL: InfoMedia, Inc. $34.50. Phone: (813) 776-2535.* The 1992 version of this annual listing of partnership practitioners, including programs managed by business, government, non-profit organizations, higher education, and schools. Over 400 program descriptions listed alphabetically, state-by-state, and by subject (from aerospace to writing). Names, titles, addresses, and phone numbers of practitioners are provided.

How to Monitor and Evaluate Partnerships in Education: Measuring Their Success and ***Partnerships in Education: Measuring Their Success.*** *By S. D. Otterbourg. Ellenton, FL: InfoMedia, Inc. $57.50. Phone: (813) 776-2535.* This two-volume set is a step-by-step guide to developing partnership monitoring and evaluation procedures. Includes a wide variety of sample forms.

Improving the Business of Education. *Washington, DC: Center for Workforce Preparation and Quality Education. $10.00, with quantity discounts. Phone: (202) 463-5525.* Presents an eight-step action plan for organizing a local business-school-community partnership to achieve educational reform. Written from a business viewpoint, but valuable for educators as well.

Linking America's Schools and Colleges: Guide to Partnerships & National Directory. *By F. P. Wilbur and L. M. Lambert. Washington, DC: American Association for Higher Education. $24.95, with quantity discounts. Phone: (202) 293-6440.* Profiles 200 partnerships. Includes an index of 1,200 partnerships, with contact information.

A Manager's Handbook to Partnerships. *Ellenton, FL: InfoMedia, Inc. $19.45. Phone: (813) 776-2535.* A "how to" guide to setting up school-business partnership programs. Recommendations presented from both the school and the business viewpoint.

Opening the Doors of Our Schools: Increasing Access to Technology. *(Due January 1992.) Palo Alto, CA: Computer Learning Foundation. $7.50.* A guide to making the school's computer technology available to children and adults in your community after hours, on weekends, and during holidays and vacation periods.

Partnerships for Learning: School Completion and Employment Preparation in the High School Academies. *(1989) By E. Archer et al. New York, N.Y.: Academy for Educational Development, Inc. (ERIC Reproduction No. ED328630).* Discusses the school-business partnership requirements of "high school academies," also known as schools-within-schools, that provide disadvantaged students with an integrated approach to academic and vocational education. Evaluates three academies and identifies keys to success. Also includes a directory of academy contacts.

Partnerships in Education. *(Summer 1990)* Educational Perspectives. *Vol. 27, No. 1. Hawaii University, Manoa. College of Education (ERIC Reproduction No. ED333068).* Eight articles that address partnerships among schools, colleges, and businesses. The partnerships described are all members of the National Network for Educational Renewal.

Partnerships in Education Journal. *Ellenton, FL: InfoMedia, Inc. $43.00 for one year; $60.00 for two years. Phone: (813) 776-2535.* A national monthly publication that focuses on partnerships among schools, colleges and universities, and the private and public sectors. Each issue is theme-oriented, with submissions solicited from readers. An expanded fall issue provides more in-depth coverage. The theme of this year's fall issue was "Education Reform."

Partnerships in Education Journal's 100 Best for 1991/92. *Ellenton, FL: InfoMedia, Inc. $28.50. Phone: (813) 776-2535.* Descriptions of and contact information for 100 exemplary partnership programs, categorized by subject. Partnerships profiled are managed by schools, corporations, chambers of commerce, and colleges.

Partnerships That Work! *Ellenton, FL: InfoMedia, Inc. $28.70. Phone: (813) 776-2535.* Describes 22 exemplary corporate, school, and community-based partnership programs. Each chapter focuses on a specific partnership theme (e.g., early childhood development, literacy, the transition from school to work). Includes a directory of the professionals who direct or manage the partnerships described, with addresses and phone numbers.

School-College Partnerships: A Look at the Major National Models. *(1988) F. P. Wilbur, L. M. Lambert, and M. J. Young. National Association of Secondary School Principals (NASSP). $8.00.* Phone: (800) 253-7746. Describes 11 different ways that colleges and high schools can work together for the benefit of high school students.

School-Community-Business Partnerships: Building Foundations for Dropout Prevention. *(April 1990) By H. H. Bucy. Clemson, SC: National Dropout Prevention Center. $8.00. (ERIC Reproduction No. ED318894).* Suggests approaches for initiating and maintaining school-business-community partnerships to address dropout prevention. Includes examples of working partnerships. Discusses the importance of program monitoring, public relations, and evaluation.

School-University Partnerships in Action: Concepts, Cases, & Concerns. *(1988) K. A. Sirotnik and J. I. Goodlad. New York, Teachers College Press. $28.95 (cloth); $16.95 (paperback).* Details school-university partnerships across the country, focusing on major population centers. Offers guidance for establishing and managing such partnerships.

Sharing Responsibility for Success. *Denver, CO: Education Commission of the States. Price: $20.00.* Phone: (303) 299-3600. Calls for a national commitment to change American education radically, and outlines strategies to help people get started. Includes seven brochures, each addressed to a different group: business and industry, local boards of education, state boards of education, district superintendents, chief state school officers, governors, and legislators.

Videocassettes

"Children in Need." *Committee for Economic Development (CED). $95 for 28-minute version; $125 for 57-minute version. Both 1/2-inch VHS and 3/4-inch formats are available. Phone: (212) 688-2063.* An award-winning documentary on the process of improving schools to help disadvantaged children succeed and the partnership role of American business in this effort. Useful as a discussion-starter at meetings involving school, business, government, and community leaders. Included with the video is a comprehensive *Resource and Reference Guide* on a partnership approach to educational reform.

"Partnerships: U.S. & United Kingdom" and ***"Partnerships at Work."*** *Ellenton, FL: InfoMedia, Inc. $47.50 (2 programs on 1 cassette). Phone: (813) 776-2535.* Approximately two hours of video presentation from eight organizations involved in educational partnerships, including schools, business, chambers of commerce, and a national government.

Organizations

Center for Workforce Preparation and Quality Education. An affiliate of the U.S. Chamber of Commerce focusing on education restructuring and workforce preparation. Its aim is to mobilize local community action through state and local chambers of commerce. Publishes documents on business's role in school reform (some of which are described above). Provides a clearinghouse of information on the education reform activities and interests of 1,300 chambers of commerce nationwide (free to local chambers). 1615 H Street, N.W., Washington, DC 20062. Phone: (202) 463-5525.

Education Interface. An information services organization that publishes a set of guides to funding and in-kind support for schools: *Guide to Corporate Support, Guide to Voluntary Support, Guide to Pre-College Foundation Support* and *Guide to Federal Government Support*. They also publish the *National Guide to Educator Empowerment*. A set of four volumes—the first three plus either of the latter two—costs $375.00, or individual volumes can be purchased separately. PO Box 3649, Princeton, NJ 08543-3649. Phone: (800) 222-3863; (609) 497-0777.

The Home and School Institute, Inc. Develops and implements partnerships among school districts, government agencies, corporations, and community organizations,

emphasizing the educational role of the family. Provides training programs and publications. 1201 16th Street, N.W., Washington, DC 20036. Phone: (202) 466-3633.

InfoMedia, Inc. A major source of published information on collaborative alliances among schools, colleges and universities, and the private and public sectors. (Many of InfoMedia's publications are described above.) Sponsors a national conference and the annual *PIE Journal National Partnership Awards*, which recognizes effective partnerships in 16 subject categories. PO Box 210, Ellenton, FL 34222-0210. Phone: (813) 776-2535.

National Alliance for Restructuring Education. An alliance of 12 states and districts deeply engaged in restructuring their schools. The alliance's focuses are student performance assessment, organizational change, and accountability and incentive systems. Assistance with preliminary planning for restructuring is provided to districts that are not part of the alliance. Contact: Michael Cohen, National Center on Education and the Economy, 1341 G Street, N.W., Suite 1020, Washington, DC 20005. Phone: (202) 783-3668.

National Alliance of Business. A business-led organization that develops business partnerships with government, labor, and education—with the goal of improving quality in education and the American workforce. Resources include publications; a partnership network; a speakers bureau; and educational institutes, symposia, and seminars. 1201 New York Avenue, N.W., Washington, DC 20005. Phone: (202) 289-2888.

National Association for Industry-Education Cooperation. A national clearinghouse for information on industry involvement in education that assists local communities in establishing industry-education councils. Focuses on school improvement, career education, and human resource/economic development. Conducts workshops, seminars, and conferences. 235 Hendricks Blvd., Buffalo, NY 14226-3304. Phone: (716) 834-7047.

National Association of Partners in Education, Inc. A membership organization providing leadership in the development of effective partnerships in education. Publishes newsletters and manuals, conducts training, organizes conferences, and conducts research. Publications include *A Practical Guide to Creating and Managing a Business/Education Partnership* ($50.00), *Guide to Long-Range Strategic Planning for School Volunteer and Partnership Programs* ($12.00), and *Partnerships Evaluation: Simple to Comprehensive* ($30.00). 209 Madison Street, Suite 401, Alexandria, VA 22314. Phone: (703) 836-4880.

School and Family Connections Program. Conducts research on and development of school-family partnerships to benefit children's learning and school success. This includes the Teachers Involve Parents in Schoolwork (TIPS) model for encouraging teachers to involve families in children's homework assignments. A free list is available of over 50 of the project's publications, materials for teachers, and questionnaires. Contact: Joyce Epstein, Center on Families, Communities, Schools & Children's Learning, The Johns Hopkins University, 3505 North Charles Street, Baltimore, MD 21218. Phone: (410) 516-0370.

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Beginning in April, you can find out more about the program by talking
with your Apple Education Sales Consultant (AESC) or Apple account executive.

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INDUSTRY NEWS

RADIO SHACK and Asymetrix Corporation have agreed to market Education Editions of *ToolBook* and *ToolBook Multimedia* authoring software to the K-12 market at substantial savings. Using this software, educators can develop instructional applications without any programming. For more complex applications they can use *ToolBook*'s OpenScript, an easy-to-learn, English-like, object-oriented programming language. *Multimedia ToolBook* includes all the features of *ToolBook*, plus those designed for multimedia applications. Normally, the suggested retail price for the complete *ToolBook* package is $395. Radio Shack's Education Division is now offering the Education Edition of *ToolBook* for $150 and the Education Edition of *ToolBook Multimedia* (normally $495) for $265. Educators can contact their local Radio Shack Education Account Representative or call (800) 321-0160 for more information. Radio Shack, One Tandy Center, Fort Worth, TX 76102.

■■■

APPLE will include a free EDUCORP CD-ROM Sampler with every Apple CD-ROM drive sold. An electronic catalog of 16 popular CD-ROM titles, the Sampler is designed to provide an informative look at what's hot on CD-ROM. The Sampler features color pictures, backgrounds and textures, music and sounds, System 7 balloons, descriptive text, and interactive educational material for all ages. With over 200 CD-ROM titles, Educorp is one of the world's leading distributors of CD-ROM products. Customers can order Educorp's free catalog of computer products including 3.5-inch disks, accessories, and CD-ROM products by contacting Educorp, 7434 Trade St., San Diego, CA 92121; (800) 843-9497, (619) 536-9999.

■■■

NAUG (National AppleWorks Users Group) has released the 1992 edition of the group's popular Public Domain Library Catalog. The 64-page catalog lists more than 200 disks filled with templates, utility programs, and fonts for *AppleWorks* and *AppleWorks GS* users from NAUG. This represents the nation's largest collection of *AppleWorks*-compatible public domain enhancements available from a single source. The Public Domain Library Catalog costs $5, which includes first-class postage and a $2 rebate that applies to any order of disks from the library. National AppleWorks Users Group, Box 87453, Canton, MI 48187; (313) 454-1115.

■■■

COMPTON'S NEWMEDIA has become the new name for Britannica Software, Inc., according to Stanley D. Frank, president of Compton's NewMedia and executive vice-president of Encyclopaedia Britannica, Inc. The name change reflects the success of the company's lead product (*Compton's MultiMedia Encyclopedia*), which was released in 1990. The electronic reference on CD-ROM has received numerous significant awards for innovation and ease of use. The name also describes Compton's growing affiliate label CD-ROM distribution program; more than 60 titles are now being distributed by Compton's under this program. Central offices for Compton's NewMedia are now in expanded facilities at Compton's San Diego facility in Solana Beach. Compton's NewMedia, 722 Genevieve, Suite M, Solana Beach, CA 92075; (619) 259-0444.

■■■

MIRALITE COMMUNICATIONS, INC., a full-service provider of satellite communications equipment and installations, has announced the 1992 Satellite Student Challenge. This year's theme is "Classes by Satellite—An Investment in Students, Education, and Equality." The three challenge categories are Short Essay, Photography, and Videotape. Any student in grades 7-12 who is or was enrolled in a U.S. satellite-delivered class at any time between September 1990 and April 1992 may enter. All entries must be postmarked no later than April 6, 1992. Winners will be announced by June 10, 1992. Official entry forms with challenge details and rules can be obtained from Miralite, 4040 MacArthur Blvd., Suite 307, Newport Beach, CA 92660; (714) 474-1900.

■■■

Announcing Virginia Educational Computing Association's "Winning Technologies" Conference, to be held at the College of William and Mary, Williamsburg, VA on March 13-14th, 1992. For more information, registration, or a call for presentations, contact Patricia Shubert, DSES, Norfolk Public Schools, 800 E. City Hall Ave., Norfolk, VA 23510 (VA Pen address is pshubert@norfolk.vak12ed.edu).

■■■

The Oklahoma State Textbook Committee has approved the first computer software program for K-8 math curriculum. JOSTENS LEARNING CORPORATION is the first computer software company to have its K-8 math program adopted in Oklahoma. Jostens' program was approved by the State Textbook Committee following three months of comprehensive evaluation for compliance with Oklahoma's mandated math learner outcomes. For more information, contact Jostens Learning Corporation, 6170 Cornerstone Court E., San Diego, CA 92121-3170; (619) 587-0087.

■■■

IBM is offering a free guide for special education teachers that helps match educational courseware to the needs of students. "IBM Educational Courseware: Integrating the Needs of Students in Special Education" was written by specialists at three leading teacher training institutions. The guide highlights key features of courseware that help address the learning characteristics and abilities of students in special education. Other areas outlined in the guide include instructional methods, content level, presentation, input, feedback to user response, and an overall assessment of the courseware. The guide is free and copies can be obtained from your local IBM representative. For the name of the IBM representative nearest you, call (800) IBM-2468.

Groupware Go

New Tools to Promote Group Activity and Learning

From collaborative writing to cooperative simulations, group-oriented technology products are moving into the schools and onto their networks.

"Bringing people together is my bent," says Ted Perry, the educational technologist for the San Juan, California, Unified School District. "So groupware fits into my natural way of thinking. We've been waiting for it to come around."

Perry is talking about new educational technology applications that involve networking and encourage group interaction among students. Called groupware, or group tools, these new software and hardware tools represent a significant departure from the software and hardware typical of computer use in education.

Networked groupware has already become one of the hottest things in the commercial world. Products like *Aspects*, by Group Technologies, make use of local and national computer networks to enable interaction and collaboration among professionals. *Aspects* allows people on a network to collaborate on documents, either in a "free-form" brainstorming fashion, where everyone adds to the document simultaneously, or in a structured manner, in which participants take turns. Interestingly, *Aspects* has also recently gone to school. It was installed just last September on a Macintosh network at the Park Tudor School, a K-12 independent school in Indianapolis.

Mainstreaming the Networked Groupware Idea

Three developments are spurring the creation and acceptance of groupware products in education. First, evidence continues to mount that cooperative learning gets results. David Dockterman, of Tom Snyder Productions—the K-12 educational publisher most of us think of first when this subject comes up—says, "Recent research in cooperative learning has confirmed our instincts about the value of human interactivity. Work by David and Roger Johnson at the University of Minnesota and Robert Slavin at Johns Hopkins University, for instance, supports the view that children actually learn better in groups than they do on their own."

The second development is that educators increasingly see a need for students to acquire group collaboration skills if they are to function effectively in the workplace they'll be entering. This message is at the core of the recently released report "What Work Requires of Schools," by the U.S. Department of Labor Secretary's Commission on Achieving Necessary Skills (SCANS). SCANS identifies five "competencies" and three "foundation skills" required for all workers, from the shop floor to the executive suite. All emphasize the group skills that kids will need to be productive in our new knowledge-based global economy.

The third development is the increasing appearance in educational settings of local-area and school-wide networks, providing the platform necessary for new groupware applications that rely on multiple user interaction and writing to common files. "Before these new groupware products came out, we tried to train teachers to use software in a way that encouraged the students to share with each other what they're thinking," says San Juan Unified's Perry. "You could call it 'low-level'

es to School:

groupware." Now, installed network technology provides the "venue."

Some Groupware Products in the Schools

To get some inside views on five networked educational groupware products, we talked to teachers who were using them on site. Three of the products focus primarily on writing, one is a networked history simulation, and the last is a system of networked hardware and software that can be put to a wide variety of uses.

Realtime Writer, from Realtime Learning Systems, creates a collaborative writing environment for students and teachers over a Novell MS-DOS network, or as part of the Computer Curriculum Corporation Instructional System. Using *Realtime Writer*, students can "talk" to each other and to their teachers over the network, in real time, as they move collaboratively through all the steps of the writing process—from initial concept formation to peer editing, to final editing and publication.

David Fletcher uses *Realtime Writer* at Lehman College of the City University of New York to develop reading, writing, and thinking skills through real-time, online dialogues. According to Fletcher, the technique could be applied to secondary school settings as well. "With the kind of dialogue *Realtime Writer* enables," Fletcher says, "students develop their ability to form hypotheses, to question, to search, and to test. And when the dialogue is finished, they can walk away with a disk or a printout to consult later during the writing process."

GROUPwriter, from Sunburst, is another example of a group writing setup. It encourages students to brainstorm across a network in a conferencing mode and then to write documents collaboratively. It runs on an AppleTalk network in an Apple IIe/IIGS or a Macintosh environment.

A student lab uses Discourse® from Interactive Communication Systems, Inc.

GROUPwriter can support up to 50 active topics, so students can log onto the network and join an ongoing discussion—about books, current events, environmental problems, or whatever they are interested in. Once a topic has been selected, the screen is split to show ongoing discussion, and at the same time to provide the student with personal writing space. Any comments that the student inputs are immediately added to the ongoing discussion. Every word that is written can be saved, printed, or copied to a word processing program.

"Using *GROUPwriter*, you can set up as many topic areas as you want," says Carolyn Perry, a fourth-grade teacher at San Juan Unified's Mariposa Elementary School and, with her husband and superintendent, Ted, a mover in the introduction of educational technology into that district. "During our unit on recycling and the greenhouse effect, we brainstormed and entered numerous sub-topics for discussion. Then the kids did research and brought in new information to elaborate on each topic."

DIScourse, from the Daedalus Group, is still another new product in the collaborative writing group. It integrates five programs to support all stages of the writing process, from brainstorming ideas, writing, and peer editing through conducting group discussions and publishing final copy. The program runs on both Macintosh and IBM-compatible networks.

At Tenafly High School in Tenafly, NJ, English teacher Margaret Boyle uses *DIScourse* on a Novell network with IBM computers in the school's writing center. An essential value of this setup, she says, is that it helps her refocus what happens in the classroom—from teacher talk to collaborative work. "The kids particularly enjoy the part of *DIScourse* called InterChange,

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where you have a real-time conversation," she says. "They feel less encumbered participating in on-screen discussions than they do in a traditional classroom discussion."

Boyle's 11th-grade English students recently worked with the MindWriter section of *DIScourse*, which uses question prompts to help students formulate their ideas, during a literature unit on *The Scarlet Letter*. "Then we started both real-time and non-realtime (conference style) discussions on students' views of Puritan values," Boyle says. "In a regular classroom discussion you just can't delve as deep as we did using *DIScourse*."

But collaborative writing programs are not the only kind of groupware running on a network. MECC's new groupware product, *Wagon Train 1848*—based on the well-known *Oregon Trail*—is a collaborative simulation in which groups of stu-

Networked Grou and Publishers

Aspects. Networked Macintoshes (1Mb) with or without a server; also runs over phone lines or wide-area networks. $189, single-user pack; $995, ten-user pack. Group Technologies, Inc., Arlington, VA; (800) 476-8781.

Realtime Writer. MS-DOS networks. $4,500 per server. Realtime Learning Systems, Washington, DC; (800) 832-2472. Also available as part of the CCC Instructional System from Computer Curriculum Corporation, Sunnyvale, CA; (800) 227-8324.

GROUPwriter. Software available for Apple IIe's (128K), Apple IIGS's (768K), and Macintoshes (800K). Communication among all three types of computer is possible over a network. $325, Macintosh; $300, Apple IIe and IIGS. Wings for Learning/Sunburst, Scotts Valley, CA; (800) 321-7511.

dents make decisions via an AppleTalk network, attempting to bring all the people in their wagon train safely across the country.

Last year, San Juan Unified's Carolyn Perry pioneered the use of *Wagon Train 1848* with her fourth-graders. Her classroom had eight computers—one for each "wagon" of four students. According to Perry, each cooperative group had to help make decisions affecting the whole wagon train. "In one case, a doctor on one wagon found he could do nothing, under the circumstances, to help a sick young girl on another wagon," she says, "and it became a very emotional thing for the students involved. Through simulated predicaments like this, we were able to 'experience' the westward movement, and to gain a deeper understanding of what it must have been like."

Perhaps the most open-ended of the groupware products, and certainly one of the most heavily hardware-based, is *Discourse*, from Interactive Communication Systems (no connection to the Daedalus Group's *DIScourse*). The system includes a network of low-profile student terminals with four-line text displays linked to a central server controlled by the teacher. Proprietary software provides the system with communication capabilities that can be used to teach virtually any subject. Teachers can converse with their students online and in real time, posing questions, monitoring the answers, and projecting selected responses on a large screen. What's more, the system can tabulate responses to multiple-choice and numerical-answer questions, charting or graphing these answers on the large screen as well.

At the innovative Saturn School of Tomorrow in St. Paul, Minnesota, the *Discourse* system is set up in a terraced discussion room that teachers use not only for writing and literature, but also for Spanish, architecture, and math courses. They have even adapted the system to poll students on controversial issues at the school or on their interest in future courses and activities.

"It doesn't matter which course you teach," says Saturn teacher Mark French. "You can use *Discourse* to lead an open-ended discussion or to check your students' understanding of the subject matter at hand." When he projects students' written comments or responses on the large screen in the room, French can choose to display—or not display—students' names with their responses. This possibility for anonymity, where only the teacher need know a student's response, encourages the students to ask questions.

The new network platforms and the sorts of products we've mentioned here make these innovative new experiences possible in our schools. Equally important, the growing recognition that group interaction is important to student learning and that group skills are essential for our nation's students means that future groupware products will likely find ready acceptance in the education market.

■ Compiled and edited by the staff of *Technology & Learning*.

pware Products

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DIScourse. Networked MS-DOS (640K) or Macintosh (1Mb) computers. $5,000 (MS-DOS) or $6,500 (Macintosh) for a 30-station site license. The Daedalus Group, Austin, TX; (512) 459-0637.

Wagon Train 1848. Networked Macintoshes (1Mb). $379 for a five-station package. MECC, Minneapolis, MN; (800) 685-6322.

Discourse. Includes proprietary hardware and software, plus software for an MS-DOS-based network server (server may be purchased from ICS or separately). The cost of outfitting a room with student terminals, teacher's controller unit, server, network, all software, and a public display monitor is approximately $27,000 for 25 stations, including installation and training. Interactive Communication Systems, Inc., Milwaukee, WI; (414) 352-4404.

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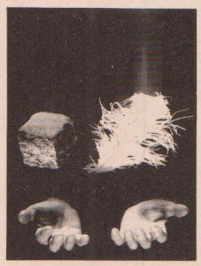

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But Where's the Film?

Instant Photography for the Classroom

By Carol S. Holzberg

An innovative camera system allows teachers and students to take pictures around school, show them on a TV screen, and incorporate them into computer documents—all in the same day.

The 1991 academic year started off with a "click" instead of a bang in several K-12 classrooms across the country. Teachers and students equipped with Canon's new XapShot camera were out in full force, photographing school activities wherever there was action to be found. Once they had captured their images, these same teachers and students were able to view them immediately on standard classroom television monitors—and in some cases, to bring up the shots on their computer screens for use in word processing or desktop publishing programs.

The Canon XapShot is being marketed in two kinds of bundles: One offers the camera alone and displays the photos on a TV set. The other offers the camera plus a ComputerEyes video digitizer, and provides users the capability of pulling images into word-processed or desktop-published documents.

The Basic Camera in the Classroom

The XapShot has the "look and feel" of an ordinary 35-mm camera. It sports a built-in flash and fixed-focus lens. But unlike an ordinary camera, the XapShot does not require photographic film. Instead, it stores pictures as still video frames (i.e., analog electronic impulses) on a reusable two-inch floppy disk that sits inside the camera. Each mini-floppy holds up to 50 images.

To view the images, the user simply connects the camera via a cable to a video-in port on the back of a standard television set. The photos, which appear either in black/white or color depending on the kind of television you use, are of high quality; however, they cannot be cropped or otherwise manipulated. You can cycle through all 50 pictures on the disk by pressing the camera's forward-feed button to advance one picture at a time, or the reverse-feed button to go back—a process similar to the forward- and reverse-button action on a carousel slide projector. The floppy can then be erased by pushing a few camera buttons, and used again with no loss of clarity—even if pictures are saved to tracks that have been erased several times.

If you ask K-12 educators why they like the Canon XapShot, the majority answer "immediacy of display." Young photographers can take pictures during any class activity—on a ball field, in the gym, in a lab, or on a field trip—and pictures will be ready for display as soon as the camera is connected to the classroom TV.

Richard Valentine, technology teacher at Gates Chili High School in Rochester, New York, uses XapShot in his photography classes to teach composition and camera techniques. Photographs can be shot and evaluated during a single class period, and Valentine claims that his students are much better able to grasp the dynamics of good composition because of the instant feedback.

Janice Bartlett, media specialist at Edwards Elementary School in West Boylston, Massachusetts, uses XapShot pictures to stimulate class discussion. Kids, she claims, become more animated when they can refer to a picture while talking. Terry Doran, director of computer technology education at Bethel Park School District in Bethel Park, Pennsylvania, likes the camera because students working on a project can more easily incorporate visual examples of their ideas into their projects. And Rhonda Hays, media coordinator at Southeast Elementary in Decatur, Indiana, appreciates the camera as an alternative assessment tool. Hays hopes to take pictures of kids as they work on projects to provide teachers with more than just conventional test results as a measure of student abilities.

Connecting to a Computer

If the XapShot could do no more than produce images on a TV screen, it would still be considered a valuable piece of educational technology. But when the camera is purchased together with the ComputerEyes video digitizer, the system can be used to capture images for later use in computer-generated documents, a capability of considerable interest to computer-using educators.

■ BUT WHERE'S THE FILM?

To use the system, you insert the ComputerEyes video digitizer board into your Apple IIGS, Macintosh, or PC-compatible computer. (For slotless Macs, there's a serial port version of ComputerEyes.) Once you've shot your pictures, you connect the XapShot via the included cable to the board in your computer. The ComputerEyes board then "digitizes" the still video images captured by the XapShot—that is, it translates the analog electronic impulses stored on the floppy disk to digital signals that can be "understood" by the computer. (Technically, the ComputerEyes board will accept input from *any* video source that emits a standard composite video signal—including a video camera, camcorder, videotape player, or videodisc player.) The software that comes with the XapShot/ComputerEyes system is designed primarily to capture an image, present it on screen, and save it to disk. As such, you'll find limited image editing capabilities beyond brightness and contrast adjustments. However, once the digital image is saved to disk, you can import it into a graphics application for more detailed editing, or bring it into a desktop publisher for page layout design.

A preview mode lets you scan through the images on the disk in your XapShot to determine which picture you'd like to capture. (This preview option is not available on IIGS computers with RGB monitors.) In the black/white Macintosh version we tested, we were able to decide whether to "capture" an image at "slow" (24 seconds) or "fast" (six seconds) speed. (Results usually improve as the capture gets slower.) ComputerEyes captures monochrome images in 256 shades of gray, and displays them in four, 16, or 256 shades of gray, depending on your monitor's configuration. If you have a computer that displays only black and white (but not gray), the images will appear in simulated halftones or dithered patterns. Quality is not as high in any pattern mode other than gray-scale.

The XapShot/ComputerEyes system affords a broad range of education opportunities. Some schools are currently using it to add photographs to their student newspapers. Before Gates Chili High School in Rochester, New York, purchased its XapShot/ComputerEyes bundle, students needed a scanner to bring photos into their computer: They would take a photo, develop it in the darkroom, make prints, and then scan those prints into their computer system. The XapShot saves time because it allows them to go directly from camera to computer.

The XapShot/ComputerEyes system affords a broad range of education opportunities. Some schools are currently using it to add photographs to their student newspapers.

Other educators perceive the XapShot/ComputerEyes system as a way to focus kids' attention on writing assignments. When students at Southeast Elementary in Decatur, Indiana, adopted a farm horse as a classroom pet, the teacher used the XapShot/ComputerEyes system to photograph the horse and print out a picture of the animal for every student. Each youngster taped the picture to the final draft of a story that he or she wrote with a word processor.

Tom Caruso, principal of Edwards Elementary School in West Boylston, Massachusetts, thinks the camera will come in handy when students go on museum field trips. Teachers will be able to digitize pictures of particular exhibits, output high-quality reproductions on a laser printer, and distribute the printouts so that each student has one for reference. And Barbara Holl, computer specialist at Rocky Ridge Elementary School in Graham, Washington, expects to use a XapShot in conjunction with *HyperCard* to create "photo" ID cards for her students.

Pricing Information

The basic Canon XapShot (RC-250) package, which outputs video images to a television screen, retails for $799, but Canon has implemented an educational pricing system that brings the cost down to $411. The package includes camera; wrist strap; soft case; one still video floppy disk; a battery pack with charger; and all the necessary cables, couplers, and power supplies.

The XapShot-plus-ComputerEyes system is also available at educational prices. For color PC-compatibles (non-micro-channel) or color Macintosh II's with NuBus slots (not compatible with Mac LC), the educational price is $740 (regular price for bundle, $1099). For black/white PC-compatibles, black/white Macs, the Mac LC (black/white mode only), or Apple IIGS systems, the educational price is $610 (regular price for bundle, $899). Educators are also able to purchase a package of ten still video floppies for $65 (regular price, $100).

Since most schools have been working with the camera only since the beginning of the school year, the full multimedia potential of the XapShot has yet to be realized in the classroom. Yet many educators seem to be impressed with the flexibility of the technology. If your school is looking for more than just a "neat" way to take and display photographs, Canon's XapShot makes good technological sense.

■ Carol S. Holzberg, Ph.D., is an anthropologist and computer journalist. She writes for several publications, works as a computer consultant, and serves as the computer resource person at the Shutesbury Elementary School in Shutesbury, Massachusetts.

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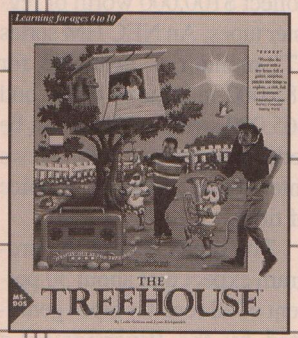

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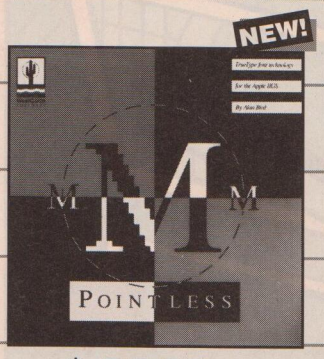

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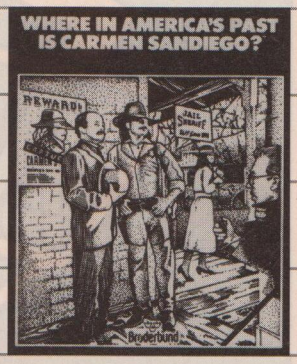

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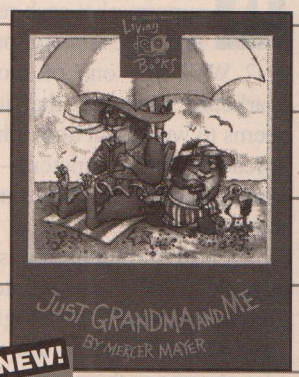

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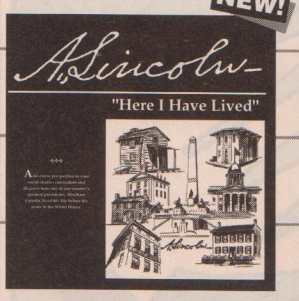

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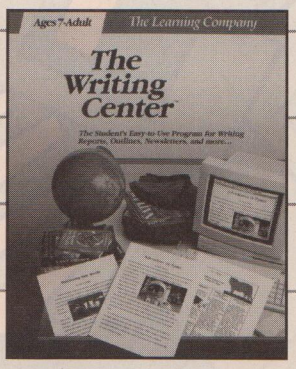

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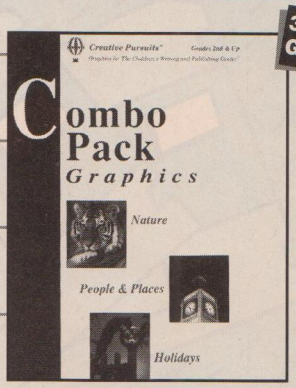

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NEWSLINE

By Daniel E. Kinnaman

TEXTBOOKS FOR TOMORROW IN SUPERMARKETS TODAY

Remember when your school first redeemed supermarket cash register tapes for computers? Well, it's one of those marketing programs that just seems to work, and now it has spread beyond computers—to laser videodisc hardware and software.

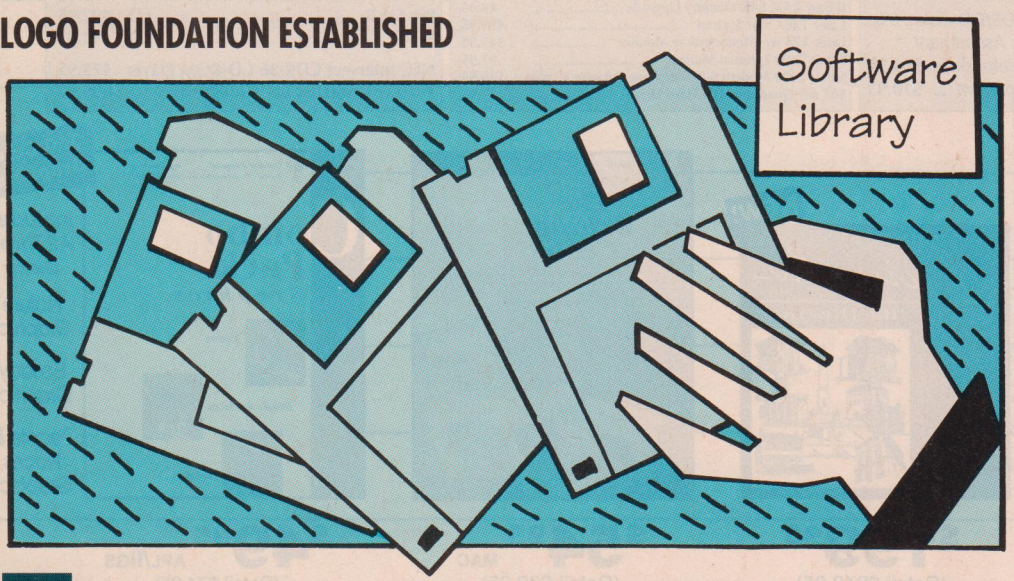
Pioneer Communications of America, ABC News InterActive, and NEC Technologies have joined forces to test the idea of using such a program to help schools acquire laser videodisc players (Pioneer), large-screen monitors (NEC), and laser videodiscs (ABC News InterActive). The program is very similar to the one that spread across the country two years ago, in which schools traded register tapes for Apple computers and software.

The videodisc program is being tested for 26 weeks in Pennsylvania with the Riverside/BiLo chain of stores. Individuals and organizations are encouraged to turn in their cash register tapes to local schools, which can then redeem them for laser videodiscs, players, and monitors.

To receive a Pioneer LD-2200 videodisc player and barcode reader, a school must collect $100,000 worth of register tapes. An NEC HM series 27" monitor is available for $85,000 in register tapes, and $65,000 worth of tapes can be redeemed for one ABC News InterActive videodisc (choice of title).

The organizers of the program expect that about 30 percent of all register tapes generated by the Riverside/BiLo stores during the program's 26 weeks will be donated to schools. That translates into more than $1.3 million worth of laser videodiscs, players, and monitors. If all goes as planned, expect a national roll-out of the program later this year.

LOGO FOUNDATION ESTABLISHED



Seymour Papert, one of the originators of Logo, has announced the formation of the LogoFoundation—a not-for-profit education organization devoted to the support of Logo-using educators throughout the world.

The Logo Foundation plans to make a special effort to work with teachers who support active, learner-centered education, but who do not yet use Logo. In addition the foundation will:

- conduct comprehensive curriculum and staff development projects in a small number of schools and districts;
- provide a range of workshops and seminars organized directly with schools around their specific educational needs and goals;
- assist educators in starting new Logo user groups;
- publish informational brochures, research summaries, workshop materials, curriculum units, and a monthly newsletter; and
- establish a public software and materials library in the foundation's New York office.

The Logo Foundation is headed by Michael Tempel, former director of educational services for LCSI. For more information, contact the Logo Foundation at 250 West 57th Street, Suite 2603, New York, NY 10107-2603; (212) 765-4918.

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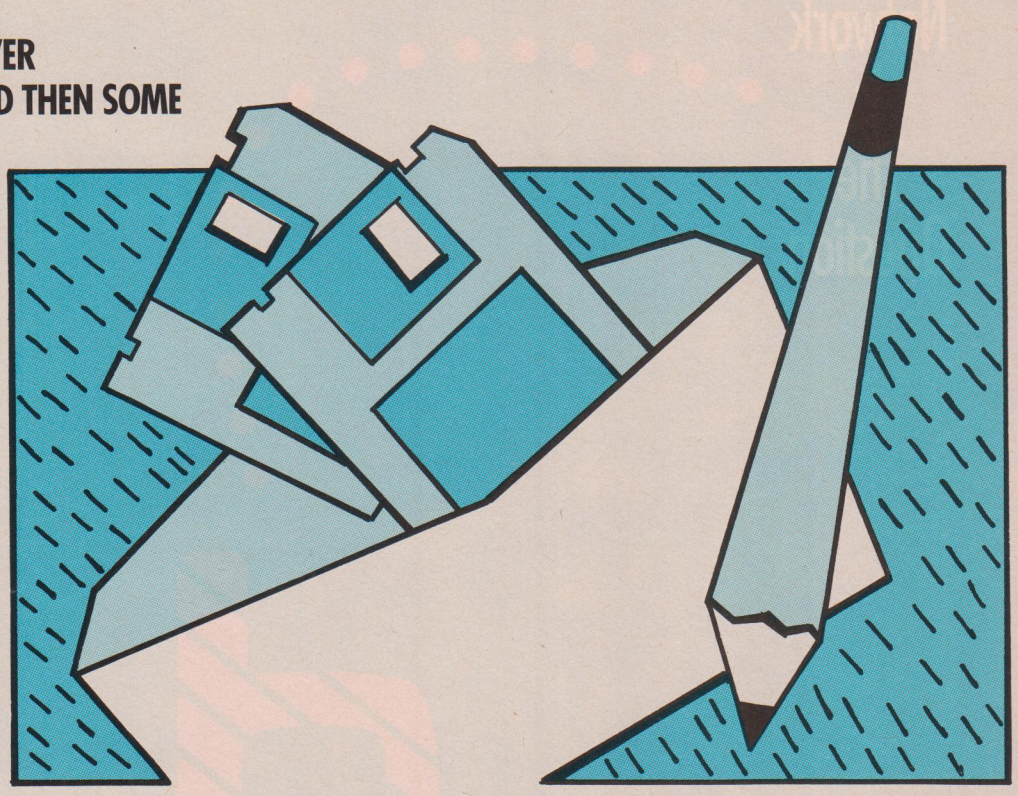


If you need to write lots of letters to parents or other interested people and you don't want to start from scratch every time, then you may want to look into a new service called *The Educators' Letter Exchange* (TELE). TELE is designed to provide educators with letters on a wide variety of topics including welcome back to school; cooperative learning; mainstreaming; whole language; skills versus process-based instruction; alternative scheduling; team teaching; the pros, cons, whys, and hows of technology; and many more.

But it's more than this wide variety of topics that makes TELE unique. The letters will be distributed on disk—for all major computer platforms—so that teachers can use them as is, or modify them as desired. Teachers are also encouraged to submit original, unsigned letters of their own for inclusion on the disks distributed by the exchange.

The exchange plans to distribute its disks at cost or free of charge through educational publishers willing to participate in the program. For more information, contact Jon Madian, Coordinator, The Educators' Letter Exchange, PO Box 950, Hood River, OR 97031; (800) 245-6737.

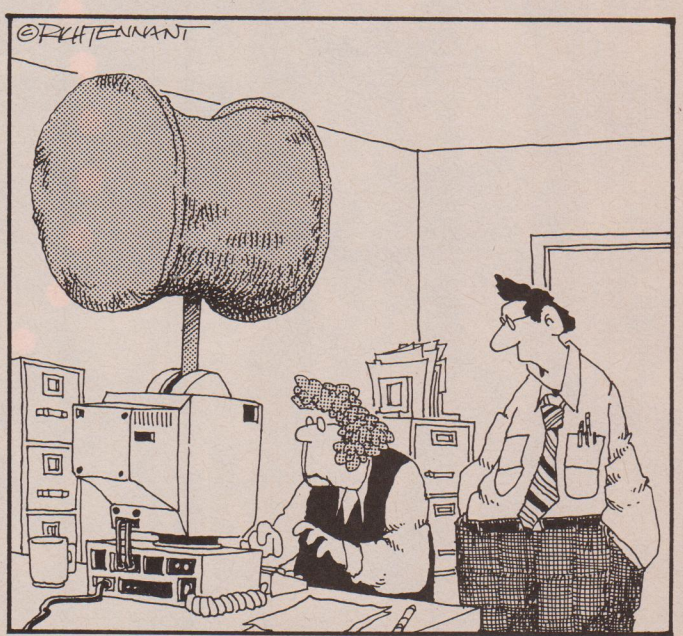
VIDEODISCS WIN BIG IN TEXAS TEXTBOOK ADOPTION

In November, 1990, the Texas State Board of Education made history by approving Optical Data's *Windows on Science* as an alternative science textbook for Texas elementary schools. The state board's adoption, the first under a new category of adoptable media called "electronic instructional media systems," gave Texas schools permission to purchase videodisc-based materials in lieu of standard textbook purchases.

Since the state adoption, more than 65 percent, or 2,574 of the 3,400 elementary schools in Texas, have purchased *Windows on Science*, according to William E. Clark, president and CEO of Optical Data. These purchases account for 35 percent of the state's elementary school textbook adoption total of $36 million.

Windows on Science provides a bilingual version, in both English and Spanish, of Texas's state-mandated elementary science curriculum in grades one through six. It consists of 11 videodiscs plus approximately 6,000 pages of print materials. The package, including a videodisc player, is available nationwide and carries a list price of $4,995.

■ *Daniel E. Kinnaman is News Editor for* Technology & Learning, *computer education coordinator for the Windham Public Schools in Willimantic, CT, and an educational consultant nationwide.*



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TECHNOLOGY & LEARNING

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CIRCLE 81 ON READER INQUIRY CARD

Special Resources for Special Ed Students

Whether you're searching for adaptive technology to meet the special needs of a particular student or group of students in your district, or trying to stay informed about the field in general, here are some valuable resources.

■ By Michael N. Milone, Jr.

Educational technology has the potential to benefit all students. For students with special needs, however, the potential gain is far greater than for non-disabled students. Whereas technology helps the typical student do things better or faster, it often enables students with special needs to do things that might otherwise be impossible. Regrettably, it is often difficult to bring exceptional students together with the enabling technology that can do so much for them.

In the course of writing a chapter for a recently released book entitled *Kids & Computers: A Parents' Handbook* (published by Sams, a Division of Prentice Hall Computer Publishing), I came across a number of resources that can help educators and parents gain access to the technology that can vastly improve the opportunities available to children with special needs. If you or the parents of the exceptional children in your school have technology-related questions, these resources will either provide answers to the questions or get you started in the right direction.

CEC

The Council for Exceptional Children (1920 Association Drive, Reston, VA 22091-1598; (703) 620-3660) houses three information centers. The Technology and Media division (TAM), which publishes a bimonthly newsletter and a quarterly journal, focuses on technology in special education. Two federally funded programs are also housed at CEC. They are the Center for Special Education Technology, a national information exchange; and the Information Center, a library and ERIC clearinghouse. If you have a question about technology and students with special needs, CEC is one of the first places to turn.

Exceptional Parent

Parents of exceptional students can be a staunch ally in responding to the education challenges their children face. To ensure they are well-informed, you might want to subscribe to *Exceptional Parent* magazine (Psy-Ed Corporation, 1170 Commonwealth Avenue, 3rd floor, Boston, MA 02134; (800) 247-8080) and encourage parents to borrow it. It's a fabulous publication, and one of its eight annual issues is devoted to technology. The Computer Technology Issue (November/December) is the best compendium of its kind I've ever seen. Two other special issues are the Annual Mobility Guide (March) and the Annual Education Issue (September). Each of these issues alone is worth the price of a subscription.

Alliance for Technology Access

The National Special Education Alliance recently changed its name to the Alliance for Technology Access (1307 Solano Avenue, Albany, CA 94706-1888; (415) 528-0476). The Alliance has 42 resource centers in 30 states that serve as information and outreach centers. Through the Foundation for Technology Access, the Alliance has established the CompuCID Project (Computer Classroom Integration Demonstration, 217 Massachusetts Avenue, Lexington, MA 02173; (617) 863-9966), which focuses on the integration of students with disabilities into school classrooms.

ABLEDATA

One of the largest computer databases of products for disabled children and adults is maintained at Newington Children's Hospital (181 East Cedar St., Newington, CT 06111; (800) 344-5405). If you or a parent has a question about adaptive devices, call the folks at ABLEDATA. They will use the information you provide about a student's needs to search the database. The resulting printout, describing relevant products and ordering information, will be mailed to you.

Closing the Gap

A wealth of information can be obtained through Closing the Gap (PO Box 68, Henderson, MN 56044; (612) 248-3294), an organization of parents, teachers, and other parties interested in solving the challenges of disabilities through technology. The organization sponsors an annual conference that's a must for professionals trying to stay abreast of developments in technology and special education. Closing the Gap also publishes a bimonthly newsletter that features hardware and software reviews. One issue a year is a resource guide, which can also be purchased separately.

IBM National Support Center for Persons with Disabilities

IBM's National Support Center (PO Box 2150-H06RI, Atlanta, GA 30301; (800) 426-2133) is a clearinghouse for informa-

tion about computer hardware and software that can benefit people with disabilities. Qualified buyers receive a discount on equipment purchased through the Center.

Worldwide Disability Solutions Group
Apple sponsors the Worldwide Disabilities Solutions Group (Apple Computer, Mail Stop 36SE, 20525 Mariani Avenue, Cupertino, CA 95014; (408) 974-7910), through which information can be obtained regarding adaptive hardware and software from Apple and others. The Group makes available two brochures, *Connections* and *Toward Independence*. The former is an overview of how computers are being used in special education and rehabilitation, and the latter focuses on technology geared toward increasing accessibility.

National Information Center for Children and Youth with Disabilities
NICHCY (PO Box 1492, Washington, DC 20013; (800) 999-5599) is a federally sponsored clearinghouse for information dealing with the entire spectrum of disabilities. It is aimed primarily at parents of disabled children or disabled individuals themselves. This is the best "first source" for lay people, and the 800 number for NICHCY should be provided to all parents, not just those with disabled children.

United Cerebral Palsy
Most people know UCP (7 Penn Plaza, Suite 804, New York, NY 10001; (800) 872-1827) by the services they provide through local chapters. In addition, UCP is involved in a national demonstration program in which computers are used to improve the communication skills of young children with cerebral palsy.

CompuServe Disabilities Forum
If you are a subscriber to CompuServe (5000 Arlington Centre Blvd., Columbus, OH 43220; (614) 457-8600), you can join the Disabilities Forum, a phenomenal resource that connects you with a wealth of information. If there is a disabilities/technology problem you cannot solve, someone in the Disabilities Forum can help.

■ Michael N. Milone, Jr., is adjunct associate professor at Ohio State University and a freelance software developer.

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20 Programs for the Macintosh from ISM, Inc., include the Talking Computer Book Series, presentation tools, CD-ROMs, and more.

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24 GeoWorks *Ensemble*—the award-winning graphical user interface and seven easy applications. Complete hands-on working model for only $9.95.

25 New Century Education is the integrated learning system that provides uniquely individualized instruction. Flexible features and management options.

26 *Interactive Physics* is physics simulation for the Macintosh—"A physics teacher's dream come true" from **Knowledge Revolution.**

27 The Talking Schoolhouse Series from Orange Cherry Software covers all curriculum areas in a creative, new format that captivates children from preschool to sixth grade.

28 Penta Corporation offers a full line of IBM-compatible educational software, including versions in English, Spanish, and French. Grades K-12.

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99 Free copy of jumbo-sized, full-color teaching aid for your classroom from IBM. Display this eye-catching, informative guide to the IBM Space Saving and Enhanced Keyboards to stimulate student learning.

BOOKS AND PERIODICALS

17 *Early Childhood News*—the only magazine designed specifically for owners, directors, and administrators of early childhood programs. Six big bi-monthly issues filled with administrative tips, updates on government regulations, product

reviews, and more. Send for your free copy.

81 *Technology & Learning* from Peter Li Publications. Helps today's educators keep current with articles on new products, unique applications, and technology teaching techniques in every issue.

82 Share the joy of learning with young people with ***Today's Catholic Teacher*** magazine. Inside every issue you'll find ready-to-use classroom ideas, curriculum strategies, professional articles, indispensable columns, special features, and much more. Send for your free issue.

96 Free from Apple Computer— *Building Effective Partnerships,* an exciting, 36-page, four-color supplement that explores school/business partnerships that will help reform education.

CONFERENCES AND CONTESTS

98 Free IBM Teacher of the Year giant-size announcement and entry information. Find out how you can be a part of the program and win valuable prizes. Write to 1992 Teacher of the Year, 2451 E. River Rd., Dayton, OH 45439-1597 or circle this number.

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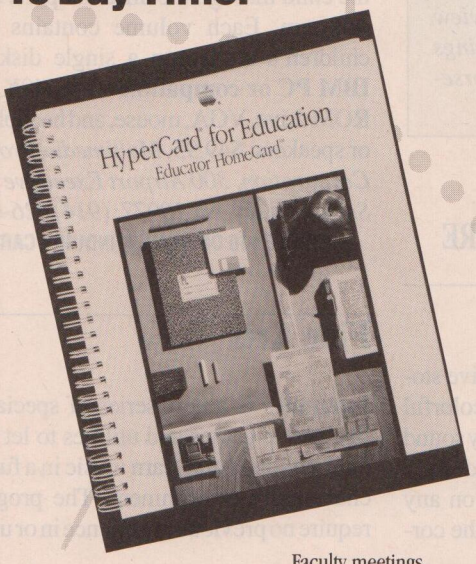

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CIRCLE 33 ON READER INQUIRY CARD

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WHAT'S NEW

What's New features information about the newest educational materials available. Our goal in providing this information is to help our readers keep abreast of new developments. Since we do not critically review products in this section, these listings should not be construed as endorsements.

CURRICULUM SOFTWARE

Early Learning

Interactive Storytime tells interactive stories to beginning readers using colorful images and high-fidelity CD-quality sound with exciting narration, music, and vivid sound effects. Children can click on any object to see its spelling and hear the correct pronunciation, click on colorful boxes to go to any page or story, or even print out a page or the entire book to color. Children can run the program themselves without much help from adults; "audio help" guides the child through the different parts of the program. Each volume contains three children's stories on a single disk. For **IBM PC or compatible** with 640K, CD-ROM drive, VGA, mouse, and headphones or speakers: $49.95. *Multimedia Products Corporation, 300 Airport Executive park, Spring Valley, NY 10977; (914) 426-0400.*

CIRCLE 110 ON READER INQUIRY CARD

Fine Arts

Interludes is a new series of specialized interactive games and utilities to let users explore sound and learn music in a fun and challenging environment. The programs require no previous experience in or understanding of music. *No. 1—NotePlay*, is a sight reading game designed primarily for keyboard players. There are 36 levels to work through, and one-handed and two-handed melodic and harmonic drills. $49.95. *No. 2—Sound Sculptor* is a utility that allows users to create and synthesize sounds in an easy and graphically attractive environment. $39.95. For **IBM and compatibles;** supports AdLib, Sound Blaster, and AdLib-compatible music cards; and any MPU-401 compatible MIDI card. *Ibis Software, 625 Second St., Suite 308, San Francisco, CA 94107; (415) 546-1917.*

CIRCLE 111 ON READER INQUIRY CARD

Foreign Language

Langue et Culture Françaises and ***Deutsche Sprache und Kultur*** are instructional programs on videodisc with interactive software. The French disc features a high-resolution 30-minute program for beginning and intermediate-level students of French, featuring native speakers. Software features fully transcribed text, oral comprehension and content-based multiple choice exercises, and online aids. $165. The German software controls the German Language and Culture videodisc (available from CALI, Inc.) for beginning and intermediate-level students. The program links and integrates 42 culturally authentic video segments and offers over 200 oral comprehension and content-based multiple choice questions. $65. Both require *HyperCard* 2.0. *Trois-Fontaines Publishers, California State University, Fresno, 2365 E. San Ramon, Fresno, CA 93740-0096; (209) 278-4587.*

CIRCLE 112 ON READER INQUIRY CARD

Health

Drugs and You shows the devastating effects of toxic drugs such as cocaine, LSD, heroin, amphetamines, caffeine, and alcohol. Users enter their age, race, and sex, then list which drugs they currently use or might use. The computer displays a graph indicating how their life expectancy changes when they use each drug. The program also presents information on

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CIRCLE 13 ON READER INQUIRY CARD

mood-altering drugs that affect the central nervous system. The program is just one feature of On Disk Monthly subscription software (Issue 63), which contains software for productivity, education, and fun. For **IBM.** *Softdisk Publishing, 606 Common St., Shreveport, LA 71130; (800) 831-2694, ext. 8000, (318) 221-8718.*

CIRCLE 113 ON READER INQUIRY CARD

Interdisciplinary

Talking Fingers is a whole language, phonics-based typing and writing program for grades K-6. Multisensory materials lead young writers through encoding and touch-typing by associating each speech sound with a finger stroke on the keyboard. Computer voice reads stories, words, or letter sounds back to the child. The full set of activities includes Typing Challenges, Sound Games, and Discovery TextWriter. Videos and other learning aids are also available. For **Apple II family** (including Macintosh LC with Apple II card): $149; five-pack, $399; eight-pack, $499. *Media Learning Center, 50 Acacia Ave., San Rafael, CA 94901-8008; (415) 456-4853.*

CIRCLE 114 ON READER INQUIRY CARD

Kid-Leidoscope Volume II combines a four-page kid's newsletter with a computer disk that supplements news stories with four award-winning computer games. Covered in this edition are ecology, early flying machines, the Information Age, the Soviet Union, and kids who made a difference. Short versions of *Ace Detective, Race the Clock, Tiffy Text*, and *Wordzzzearch* are specially tailored to fit the articles in the newsletter. With the computer games, students practice concentration, mad-libs, mystery solving, and word search. For **Apple, IBM:** $79; lab-pack, $200; network versions available. *Mindplay, Methods & Solutions, Inc., 3130 N. Dodge Blvd., Tucson, AZ 85716; (800) 221-7911.*

CIRCLE 115 ON READER INQUIRY CARD

Windows on Science is now available in a bilingual, English and Spanish version. This edition of the videodisc-based curriculum meets the fundamental require-

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CIRCLE 21 ON READER INQUIRY CARD

ments for life, earth, and physical science study in grades 1-3. The three-volume bilingual version combines language and content instruction to help native Spanish-speaking students learn science as well as English. The new program is appropriate for English as a Second Language and bilingual curricula. All printed teacher resource materials, including lesson plans, unit summaries, and student activity masters, are in both English and Spanish. Bilingual edition bundled with videodisc player: $1,995. *Optical Data Corporation, 30 Technology Dr., Warren, NJ 07059; (908) 668-0022.*

CIRCLE 116 ON READER INQUIRY CARD

Mathematics

Mutanoid Math Challenge is for ages 7-14. Children create intersecting equations on a Scrabble-like gameboard while playing against alien opponents. They practice math facts at three levels of difficulty and solve challenging word problems. Not a "fill in the blank" approach to math education; children generate many different solutions to the problems. While constructing equations, they learn to manipulate numbers and operands, reason deductively, and practice mental estimation skills. For **IBM, Tandy, and compatibles:** $49.95; school version, $69.95; lab-pack, $149.95. *Legacy Software, 8817 Reseda Blvd., Suite B, Northridge, CA 91324; (818) 885-5773.*

CIRCLE 117 ON READER INQUIRY CARD

Science

What's the Difference? The Classification ToolKits, designed for grades 7-12, is an illustrated, interactive database to be used as a tool for studying the animal kingdom. And it actually enables students to create their own interactive classification keys. Each of the two titles in the series—*Vertebrates* and *Invertebrates*—is a complete toolkit for the science or biology classroom, including software and a comprehensive teacher's guide with sequenced lesson plans, activities, and reproducible worksheets. The software has an easy point-and-click interface and the database includes beautifully rendered pictures. For **Macintosh** with *HyperCard* (any version): $79.95 each title; $139.95 for both; ten-disk lab packs are $239.95 each title, $399.95 for the set. *Tom Snyder Productions, 90 Sherman St., Cambridge, MA 02140; (800) 342-0236.*

CIRCLE 118 ON READER INQUIRY CARD

Sugar Science: Photosynthesis to Food is a new computer-based science teaching kit targeted at children in upper elementary through middle school. State-of-the-art animated graphics and comprehensive collateral materials allow students to explore photosynthesis, respiration, the food chain, and more. The program also teaches basic chemistry in lessons on the functional roles sugar plays in everyday foods. Each lesson plan includes objectives, process skills, glossary, review questions, in-class or at-home duplication of the on-screen experiments, worksheets, and suggested further studies. The program was created by the Sugar Association and reviewed by the National Science Teachers Association. For **Apple II family, IBM, and Tandy.** *The Sugar Association, Inc., 1101 15th St., NW, Suite 600, Washington, DC 20005; (202) 785-1122.*

CIRCLE 119 ON READER INQUIRY CARD

Graphical Analysis for the Macintosh helps students use graphical methods to analyze experimental data. Data can be entered directly into the program or imported from text files and are graphed as they are entered. Data can be mathematically modified to help search for the relationships between variables. Included are log, trigonometric, and delta functions. Multiple graphs are supported. Graphs can be scaled and styled to display data best. Tables and graphs can be saved, printed, or transferred into word processing and spreadsheet programs. For **Macintosh:** $49.95 for a site license. *Vernier Software, 2920 SW 89th Ave., Portland, OR 97225;*

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CIRCLE 20 ON READER INQUIRY CARD

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CIRCLE 120 ON READER INQUIRY CARD

Astronomy Lab is a versatile and comprehensive astronomy program available for Microsoft *Windows* 3.X. The program produces seven movies that simulate a host of astronomical phenomena, 14 graphs that illustrate many fundamental concepts of astronomy, and 14 printed reports that contain predictions of the most important astronomical events. All are customized for the user's time zone and location. All reports, graphs, and movie frames can be copied into other *Windows* programs such as word processors and paint programs, and can be printed on *Windows*-compatible printers. For *Windows* 3.X or later: 59.95. *Personal MicroCosms, 8547 E. Arapahoe Rd., Suite J-147, Greenwood Village, CO 80112; (303) 753-3268.*

CIRCLE 121 ON READER INQUIRY CARD

Social Studies

New social studies programs are available from Intellimation's Library for the **Macintosh**. *Balance of the Planet* challenges students to try to save the planet by solving environmental problems. *Presidential Election Project* is a comprehensive reference resource. *Geography Challenge* is a skill-building program that challenges students at three levels of difficulty with hundreds of maps. *Engines of Change: The American Industrial Revolution, 1790-1860* is based on the American Industrial Revolution exhibit at the Smithsonian's National Museum of American History. *Treaty of Versailles* is a simulation of diplomats who drafted treaties ending World War I. *The Vietnam War* is a *HyperCard* history book that covers 61 different aspects of the war. *Intellimation, 130 Cremona Dr., PO Box 1922, Santa Barbara, CA 93116-1922; (800) 3-INTELL.*

CIRCLE 122 ON READER INQUIRY CARD

SOFTWARE TOOLS

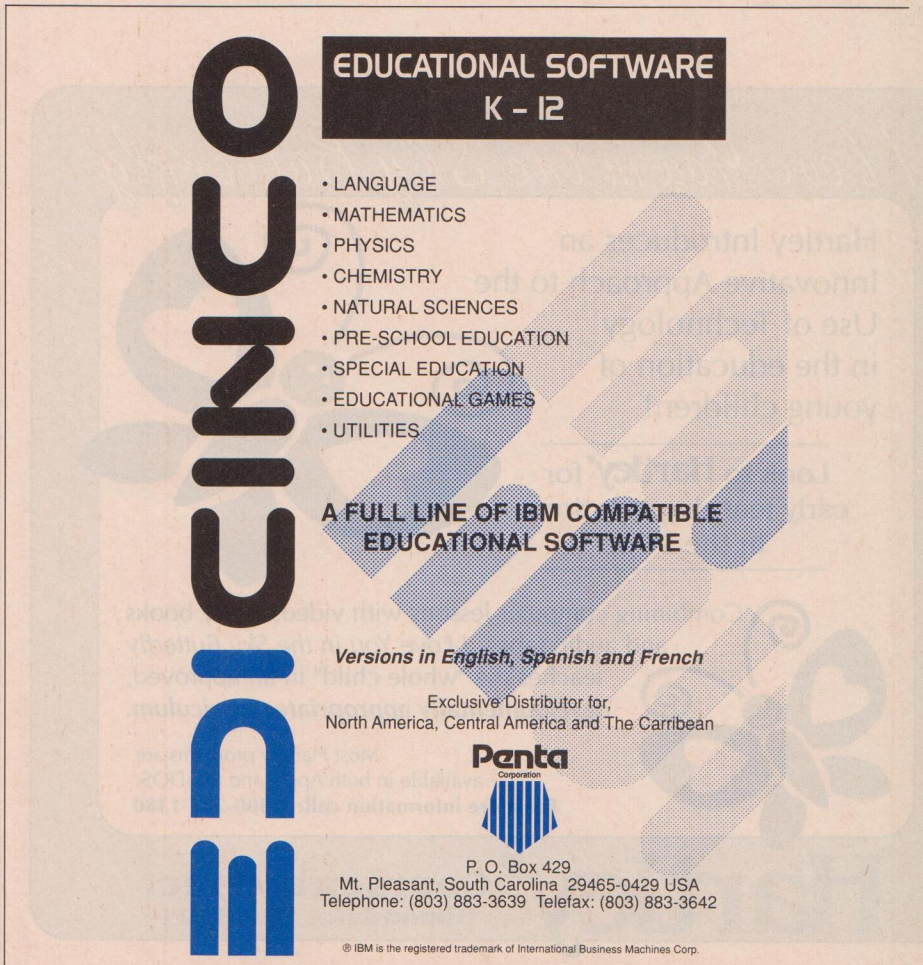
Scholastic SuperPrint for the Macintosh is a new edition of the popular program designed for the classroom. Special features include a comprehensive paint palette; word processing capabilities; galleries of clip art, frames, and background scenes; capability to create your own clip art galleries; TrueType technology; high-quality printing, offering color as well as black-and-white; and print sizes from Miniature to Super for creations from 4 1/4" x 5" to 40" x 50". The program has four design formats: Poster, Banner, Calendar, and Card. For **Macintosh** with 1Mb RAM and System 6.0.7 or later. Teacher's Edition: $129.95; network edition, $649.75. *Scholastic Software, PO Box 7502, 2931 E. McCarty St., Jefferson City, MO 65102; (800) 541-5513.*

CIRCLE 123 ON READER INQUIRY CARD

Disney Presents The Animation Studio for MS-DOS is a full-featured animation program using state-of-the-art techniques including an exclusive "onion skin," see-through cel animation feature. For the beginner or novice, the basics of cel animation are taught in an easy-to-learn fashion. Sample Disney animations and tutorials on animation techniques such as "Squash and Stretch," "Anticipation," and more are included. The Ink and Paint tool provides up to 256 colors to colorize animations, and the program supports The Sound Source, Sound Blaster, and Tandy Sound. For **MS-DOS** with 640K: $129.95. *Walt Disney Computer Software, Inc., 500 S. Buena Vista St., Burbank, CA 91521; (818) 567-5340.*

CIRCLE 124 ON READER INQUIRY CARD

DeskMate personal productivity software is now available in a new Spanish version. Spanish *DeskMate* has the same integrated collection of applications as the current Version 3.5 of *DeskMate*, including applications for writing letters, budgeting, filing, and scheduling appointments. The program also includes an easy-to-use draw program and word game for educational and entertainment uses. The program, its pull-down menus, pop-up dialogue boxes, online help and tutorial functions, and



CIRCLE 28 ON READER INQUIRY CARD

manuals are all in Spanish. For **Tandy MS-DOS and compatibles:** $99.95. *Radio Shack, 700 One Tandy Center, Fort Worth, TX 76102.*

CIRCLE 125 ON READER INQUIRY CARD

LinksWare is now available for the **Macintosh.** It allows the creation of hypertext and hypermedia links within industry-standard files such as *Word, WriteNow,* RTF, and many others. Double-clicking on a selected "hot-word," and then on a selected text, graphic, or sound file, creates a permanent link file for easy retrieval and display. Keeping the links in a separate file allows editing to be done without changing the links or files themselves, and allows indexing of CD-ROMs. $189. *LinksWare Corporation, 812 19th St., Pacific Grove, CA 93950; (408) 372-4155.*

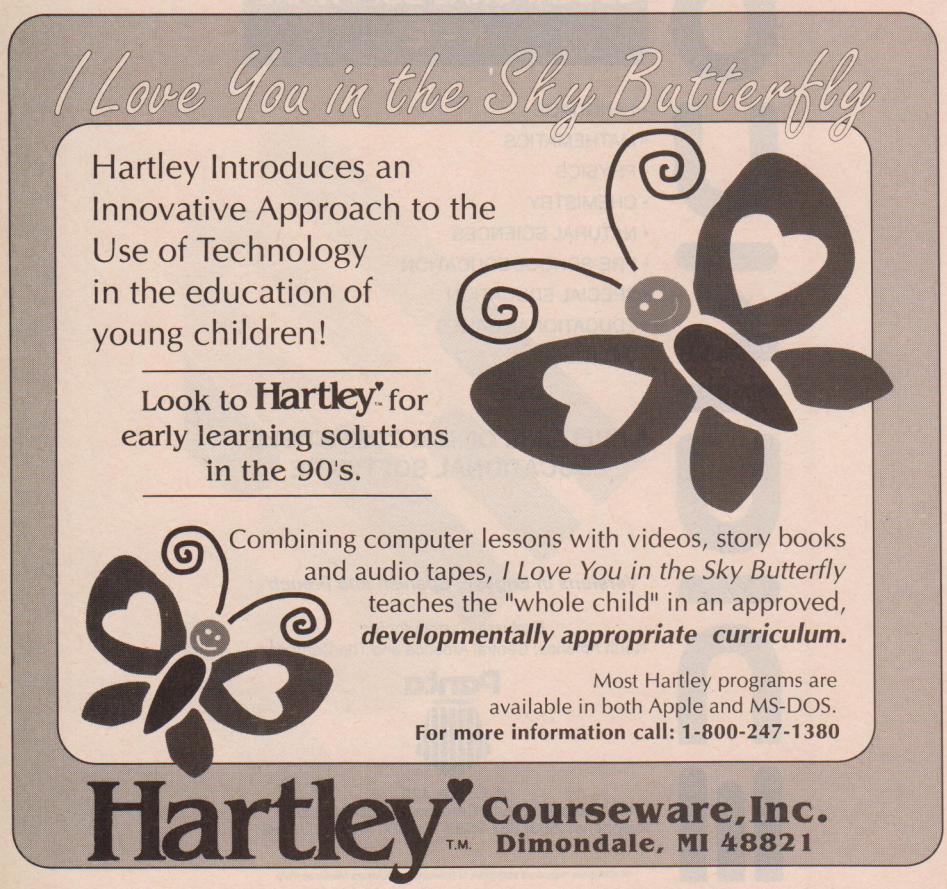
CIRCLE 126 ON READER INQUIRY CARD

Chronos is a tool for creating multimedia timelines of history and the future with graphics, digitized sound, and compact disc audio sound. With user-defined box styles, text fonts, sizes, and styles; full-color support; freely positioned pictures; and pop-up comments, graphic timelines can be created to convey a wide variety of information. Several documents come with *Chronos*, including World Biographies, Science and Technology, and Music History. Online help is included as well as free technical support. The manual includes tutorials, a window and menu reference, shortcuts and tips, and a glossary. The program can be used to create single-page timelines, multi-paged wall charts up to 50 x 50 pages, transparencies, and color slides. Text data can be imported and exported to other applications including databases and word processors. For **Macintosh Plus** or better with System 6.0.2 or later: $150. *Imaja, PO Box 6386, Albany, CA 94706; (510) 526-4621.*

CIRCLE 127 ON READER INQUIRY CARD

Student's Dreamtools is a package of three *HyperCard* stacks: "Events Day-by-Day," "The Stack of Lists," and "The Stack of Decades." It comes complete with *HyperCard* 2.0 and a specially customized Home Stack. "Events Day-by-Day" has been updated and now will reveal the day of the week for any date going back to 4,000 B.C. "The Stack of Lists" consists of over 600 complete lists of people, places, and things in categories such as Names, Sciences, Tools, Foods, brand names, Anatomy, Vehicles, Aviation, Animals Famous People, and many more. "The Stack of Decades" includes a card for each decade going back to the 1650s and features events in art, music, literature, entertainment, media, religion, science and medicine, money, and more. For **Macintosh** with System 6.0.5 or greater and hard disk with 2.9Mb free space: $89. *Slippery Disks, PO Box 1126, Los Angeles, CA 90069; (213) 274-3600.*

CIRCLE 128 ON READER INQUIRY CARD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CIRCLE 18 ON READER INQUIRY CARD

GUIDANCE AND TESTING

Career Interactive is a *HyperCard*-based application that provides students (grades 9-12) with interactive and individualized computer lessons to facilitate pre-career awareness. Features include interactive exercises and surveys; illustrated examples and stories; online career match; student portfolio reports; and more. The program can be used effectively in both individual counseling and classroom settings and is easily incorporated into a variety of curricula. For **Macintosh Plus** or better: $69.95. *Avenues Software, PO Box 192423, San Francisco, CA 94119; (510) 222-1044.*

CIRCLE 129 ON READER INQUIRY CARD

SPECIAL EDUCATION

Three new products are available from Unicorn Engineering. The Unicorn Smart Keyboard plugs directly into the keyboard port of an Apple IIGS, Macintosh, IBM, or compatible computer. No interface or additional hardware is required. Any program that works with a standard keyboard works with the Unicorn Smart Keyboard.

(continued on page 102)

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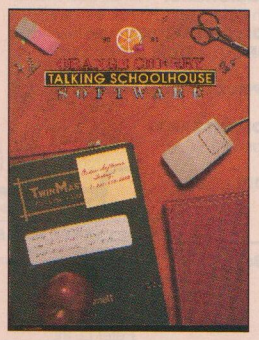

This full-color, 40-page catalog features a new generation of "talking" software for grades Pre-K to 8th. It uses perfect human voice and the most stunning graphics imaginable to teach basic skills. See why children, teachers, and parents have been amazed and delighted by our super sound and graphics. Included are more Apple IIGS-Specific and Commodore programs than any other publisher. Order your catalog TODAY by circling number below or calling our Customer Service Department at (800) 672-6002.

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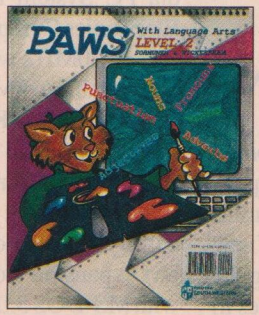
SOUTH-WESTERN PUBLISHING CO.

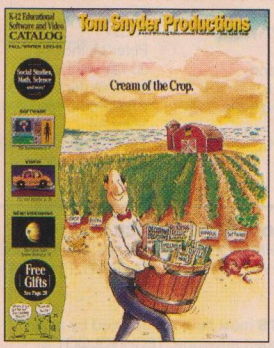


PAWS With Language Arts, *Level 2* has merged keyboarding and the writing process into one comprehensive courseware package. Designed for 5th and 6th graders, this courseware first guides students through a review of the keyboard. Then, it's on to challenging composition activities designed to strengthen critical-thinking skills and improve writing ability. Circle reader service card #43 for more information.

Circle 43 on Reader Inquiry Card

TOM SNYDER PRODUCTIONS

Educational Software and Video



Tom Snyder Productions specializes in using technology to promote group learning. This catalog offers a complete line of K-12 software (Apple, Mac, and IBM), video, and video disk products for all areas of the curriculum, including social studies, math, science, and language arts. Many programs for the one computer classroom. Network versions too! Write Tom Snyder Productions, 90 Sherman St., Cambridge, MA 02140 or call **1-800-342-0236**.

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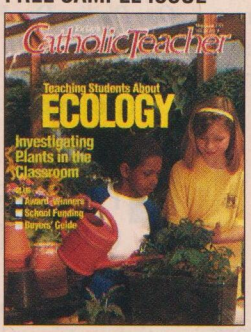
Today's Catholic Teacher — The Voice of Catholic Education

FREE SAMPLE ISSUE



Today's Catholic Teacher has been a staple resource for Catholic school teachers and administrators for 25 years. Focusing on the special needs of our subscribers, *Today's Catholic Teacher* is unsurpassed as a networking tool and an avenue by which educators and administrators gain valuable insights into new curriculum and teaching ideas. Call 1-800-543-4383 for a **FREE sample issue** or write to: *Today's Catholic Teacher,* Dept. SL20, 2451 E. River Rd., Dayton, OH 45439-1597.

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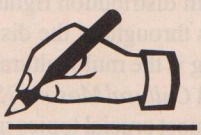

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WHAT'S NEW

(continued from page 100)

It comes with seven overlays; adjustable sensitivity, repeat rate, and more. $395. *Unicorn Overlay Express* lets users design and print custom overlays, save, re-load, and edit them. Comes with two libraries of pictures. $140. *Picture Communication Symbols Icon Library* offers over 1100 augmentative communication symbols on disk, organized into categories. Drawings are simple and clear; accompanying words can be printed as is, customized, or omitted. $99. *Unicorn Engineering, 5221 Central Ave., Suite 205, Richmond, CA 94804; (800) 899-6687, (510) 528-0670.*

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BOOKS AND PUBLICATIONS

The Athelstan Newsletter on Technology and Language Learning is a free quarterly for educators and educational administrators. It contains announcements of new products and short articles concerning the use of computer and other technologies in the language classroom. (In addition, a sponsoring subscription is available for $10 per volume.) Also available is a catalog in the form of a *HyperCard* stack of CALL books, software, videos, videodiscs, CD-ROMs, and other products from Athelstan. It costs $2 post paid or is sent free, when requested, with orders over $5. *Athelstan, PO Box 8025, La Jolla, CA 92038-8025; (619) 689-1757.*

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ONLINE SERVICES

Modern Educational Video Network (MEVN) is a delivery system that carries video collections made available by satellite to school districts with distribution rights for use in classrooms throughout the district. The first offering is the multicultural collection: *America: A Cultural Mosaic*, 75 videos on one of the most crucial topics in classrooms from kindergarten to grade 12. Subscription cost varies from $2,500 to $10,000 depending on the number of students and classrooms in the district. *Modern, 515 Madison Ave., Suite 500, New York, NY 10022; (212) 838-6877, (800) 443-7393.*

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COMPUTERS

The 386SX-20 MPC is the first Multimedia PC System from Philips Consumer Electronics Company. The 80386SX CPU runs at 20MHz with 4Mb RAM standard (upgradable to 8Mb), an 80Mb hard drive, Super VGA (512K video RAM supporting 640 x 480 x 256 color resolution), and a 680Mb MPC-compatible CD-ROM drive. It also features a 3.5-inch, 1.44Mb high-density external disk drive and three (16 bit) expansion slots. It comes pre-loaded with MS-DOS 5.0, Q-BASIC, Microsoft's *Windows 3.0 (with Multimedia Extensions)*, Microsoft *Works*, Microsoft *Multimedia Bookshelf*, and other multimedia applications. Suggested retail price is $2,499. *Philips Consumer Electronics Company, One Philips Dr., PO Box 14810, Knoxville, TN 37914-1810; (800) 722-6224, (615) 475-8869.*

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PERIPHERALS AND COMMUNICATION DEVICES

TVT 6000 is a portable, high-resolution, active matrix color LCD video projector featuring stereo sound. It offers 630,000 pixels for very high-quality resolution, and projects NTSC video as well as computer graphics and data. At 24 pounds, the unit is compact and easy to set up. A remote control allows the user to switch among up to three different video sources during the presentation. Image size ranges from 14 inches to 100 inches. The TVT 6000 connects to video sources via BNC video inputs, S-video terminals, and analog RGB. $7,995. *In Focus Systems, 7770 SW Mohawk St., Tualatin, OR 97062; (800) 327-7231, (503) 692-4968.*

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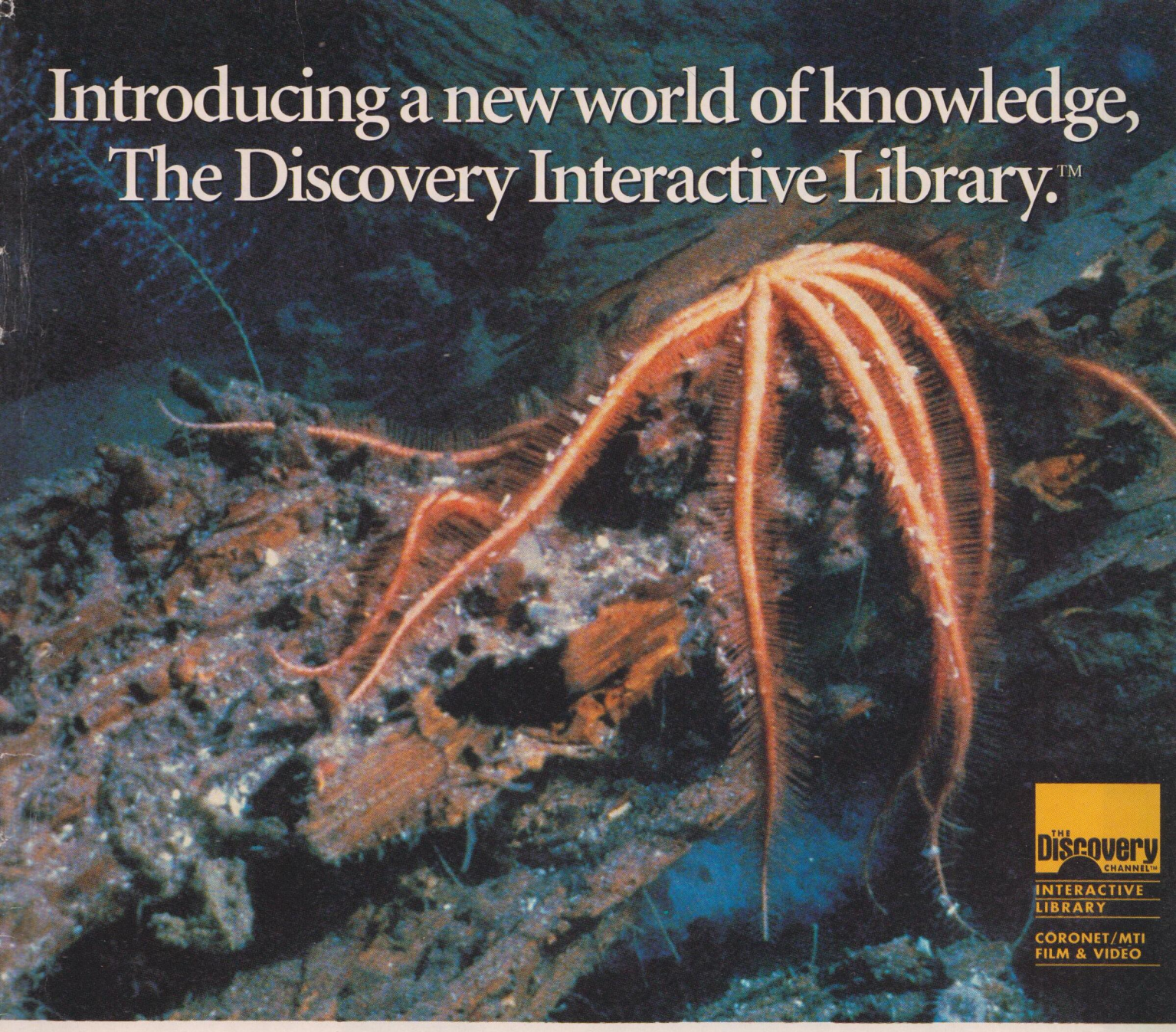

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Combined with traditional classroom instruction, The Discovery Interactive Library brings new adventure to learning. Simple-to-use software lets students pursue their natural curiosity and allows you to design your own lesson plans. Discovery interactive videodiscs are based on high-quality Discovery Channel documentaries and each opens new worlds of knowledge and experience for middle and secondary school students.

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Discovery interactive videodiscs offer distinct educational advantages. Each program:

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- Operates at both Level I and Level III interactivity
- Works with only 2 megabytes of hard disc space on Apple® Macintosh® or MS-DOS® compatible systems
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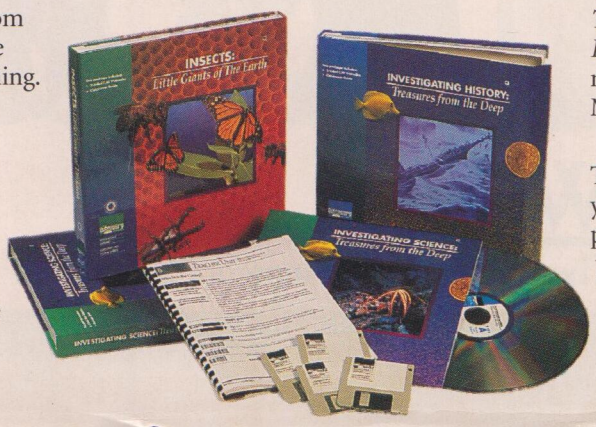

Currently, The Discovery Interactive Library includes three titles: *Insects: Little Giants of the Earth; Investigating Science: Treasures from the Deep;* and, *Investigating History: Treasures from the Deep.* Three more titles are scheduled for release in March, 1992.

Of course, this is only a glimpse of what The Discovery Interactive Library can do in your classroom. To harness the educational power of computers and video, to spark your students' natural curiosity, and get your students excited about learning, call 1-800-621-2131 today.

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America's Children

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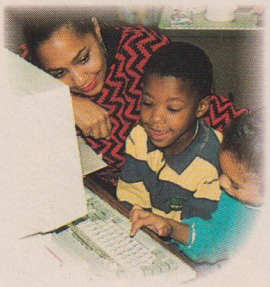

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